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DEPARTMENT OF NATURAL RESOURCES

Division of Wildlife Resources - Utah Natural Heritage Program

**RARE, IMPERILED, AND RECENTLY EXTINCT OR EXTIRPATED
MOLLUSKS OF UTAH**

A LITERATURE REVIEW

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Utah Division of Wildlife Resources

1594 W. North Temple

Salt Lake City, Utah

John F. Kimball, Director

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by

George V. Oliver and William R. Bosworth, III

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**Utah Division of Wildlife Resources
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30 June 1999

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Introduction

About 139 species of mollusks are known to occur, or within historical times to have occurred, in Utah. The number of known Utah mollusks is not fixed and can be expected to continue to change, increasing as new molluscan discoveries are made in Utah and possibly decreasing as taxonomic revisions change our concept of how many valid mollusk species exist.

This report represents one of the end products of a review of literature—published journal articles and books as well as unpublished agency reports—dealing with mollusks in Utah. The goals of this review were to determine (1) which species have been documented from the state, (2) extent of knowledge of the status—abundance, distribution, conservational needs, and so forth—of each of the species in Utah, and, thus, (3) which species are of conservational concern in the state. This report summarizes the assembled information pertaining to the last goal, the 79 molluscan species that are of conservational priority—or of conservational interest in the cases of those believed to be extirpated or extinct; it is intended to help guide current management of the molluscan resources of the state as well as to identify gaps in existing knowledge that will need to be filled in order to manage these resources more effectively in the future.

Some of the understanding that is important for truly effective management of Utah's mollusks is lacking, especially with regard to our knowledge of threats to and population trends in these species. Threats to various species discussed in this report should be understood, in most cases, as potential threats, often based on educated guesses. Similarly, information pertaining to population trends of mollusks in Utah is largely unavailable from the existing literature. Despite the incompleteness of reported information concerning Utah mollusks, much is known, and this information obtained from the literature provides an valuable base from which to plan future work.

Mollusks, as a group, are thought to be among the most endangered of animal groups that occur in North America, but this is a new awareness, and conservational management attention has only recently begun to be directed toward this group. The Utah Division of Wildlife Resources now has management authority for all mollusks in the state and is establishing mechanisms and procedures for the management and protection of the state's molluscan resources.

Parties interested in conducting research on or collecting mollusks in Utah should direct inquiries regarding permits to: Ms. Suzanne McMullin, Utah Division of Wildlife Resources, 1594 West North Temple, Suite 2110, Salt Lake City, Utah 84114 (telephone: 801-538-4701).

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***Margaritifera falcata* (Gould, 1850)**
western pearlshell

Utah Taxonomy

This species was reported in the early literature for Utah as *Margaritana margaritifera* and was referred to by the common name, the river pearl mussel (e.g., Chamberlin and Jones 1929).

No subspecies are currently recognized.

Status in Utah

Formerly at least 11 localities (representing perhaps 9 populations) were known in Utah. Current opinion is that all populations in Utah have been extirpated (see Clarke 1993), though there is the possibility that small populations still exist at known historical localities or that some populations remain to be discovered. Formerly, this species occurred in the northern third of Utah (Call 1884, Henderson 1924, Chamberlin and Jones 1929, Woolstenhulme 1942a, 1942b).

The size and extent of historical populations was not reported.

Clarke (1993) asserted that "overutilization of water resources by man" is responsible for the extirpation of this species. Despite the fact that no populations have been found at historical localities recently (viz. Clarke 1993), discovery of an extant population is still a possibility. Individuals of this species can be quite long-lived; populations could exist undetected at low levels for many years. Continued efforts to relocate populations are needed throughout northern Utah.

The possibility that some of the historical localities were, in fact, based on introduced individuals may have lead to a misinterpretation of the historical range of this mussel in Utah. As Clarke (1993) stated: "It is probable, however, that at least some of the historical records for this species resulted from glochidia which were shed from imported trout used for stocking purposes, and that those finds did not represent reproducing populations in Utah."

Habitats Utilized in Utah

Nearly all Utah localities are small streams, but detailed Utah habitat data are unavailable.

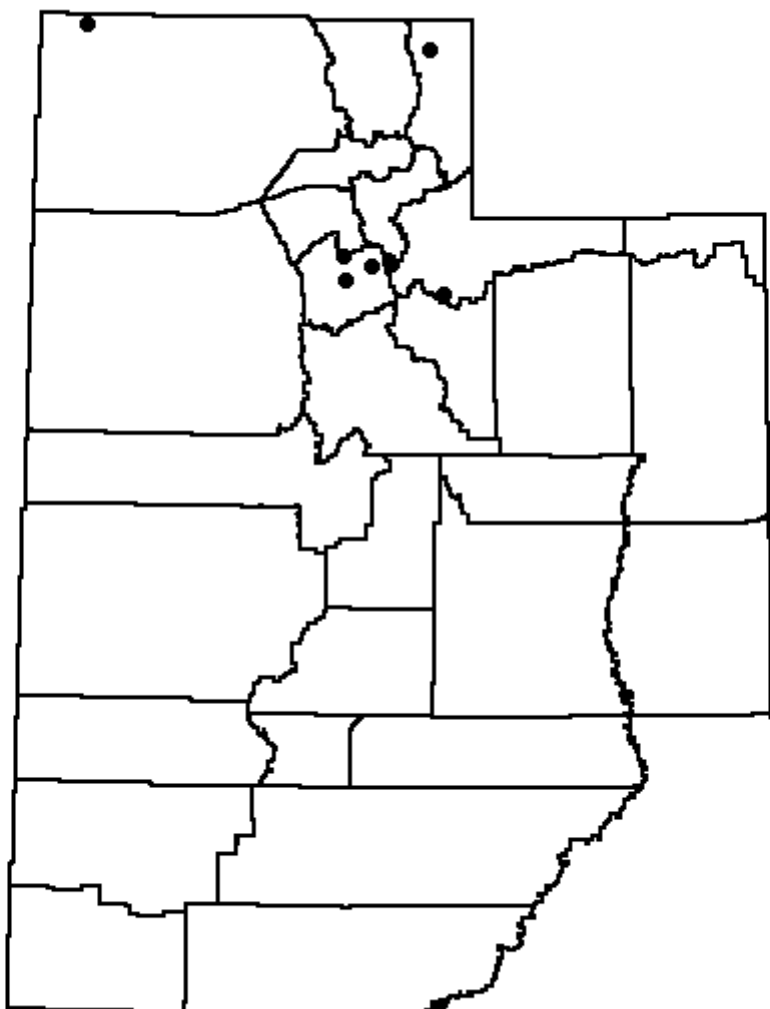


Figure 1. Utah localities for the western pearlshell (*Margaritifera falcata*) obtained from literature.

***Anodonta californiensis* I. Lea, 1852**

California floater

Utah Taxonomy

This species was reported in Utah by Call (1884) as *Anodonta nuttalliana*, the name under which he synonymized *A. nuttalliana*, *A. wahlametensis*, and *A. californiensis*.

As currently recognized, this species is monotypic.

Status in Utah

At least 2 extant occurrences are known in Utah (see Clarke 1993), possibly as many as 6. This species was historically reported from Utah and Millard counties (Henderson 1936). There has been a recent report of fresh shells from Rich and Tooele counties and shells of unspecified age (and thus not mapped) from northwestern Box Elder County (Clarke 1993).

Abundance at most Utah localities is unreported, but Clarke (1993) stated that this species "occurs abundantly" at "Reddin Spring [*sic*]".

Pesticides in agricultural run-off, habitat degradation by cattle, and water diversion are the most immediate threats. Fish management practices including fish control with poisons and introduction of exotic fishes are also threats.

This species is apparently declining in Utah; historical populations in the Raft River (Box Elder County), Utah Lake (Utah County), and Bear Lake (Rich County) are possibly extirpated (see Clarke 1993).

Inventory is needed, particularly in drainages in the Great Basin, as is continued monitoring of known populations.

Considerable confusion exists concerning this and other floaters (*Anodonta*) in Utah. How many species of floaters occur or historically have occurred in this state is uncertain, and whether reported Utah specimens of floaters have been correctly identified is questionable. The most comprehensive work on Utah mollusks, by Chamberlin and Jones (1929), discussed 4 nominal species of floaters and provided specific localities, from the earlier literature as well as new records, for 3 of the 4 species; only for *Anodonta californiensis* did Chamberlin

and Jones (1929) have no specific Utah localities, commenting: "We have not recognized it in material known to us."

Habitats Utilized in Utah

Clarke (1993) found very different habitat profiles at two localities. At one, this species "occurs abundantly at depths of about 6 to 12 inches, among watercress, on a muddy bottom in two small ponds joined together by a ditch." The other locality was a creek "5 to 15 feet wide, up to 18 inches deep, with a bottom of gravel and sand in flowing areas and mud in pools, and with abundant *Myriophyllum* and *Spirogyra*."

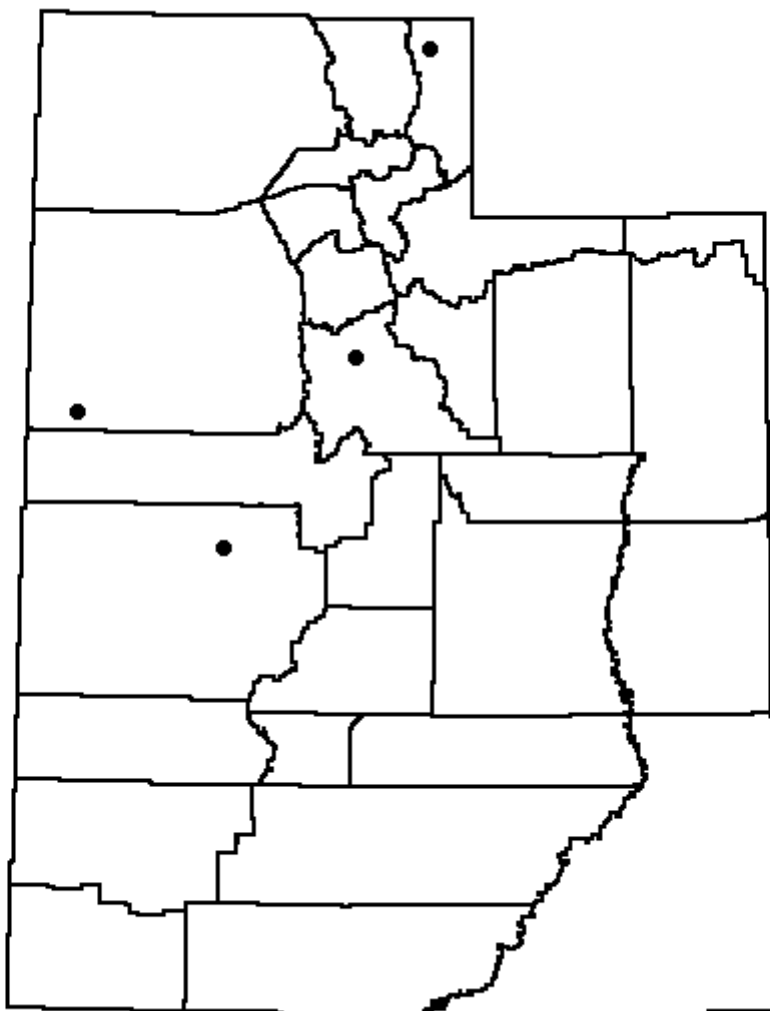


Figure 2. Utah localities for the California floater (*Anodonta californiensis*) obtained from literature.

***Anodonta nuttalliana* I. Lea, 1838**

winged floater

Utah Taxonomy

Since the time of Call (1884) there has been much confusion regarding the taxonomic status of this and other floaters (*Anodonta*) of western North America. Call (1884) considered *Anodonta nuttalliana* to include, as synonyms, *Anodonta wahlametensis*, *Anodonta oregonensis*, and *Anodonta californiensis*, but no other authors who have published on the floaters of Utah have followed such an arrangement.

Burch (1975) recognized *Anodonta californiensis*, *Anodonta nuttalliana*, and *Anodonta oregonensis* as valid species and listed all three as occurring in Utah; he did not recognize *Anodonta wahlametensis* as a species. Similarly, Turgeon et al. (1988) recognized *Anodonta californiensis*, *Anodonta nuttalliana*, and *Anodonta oregonensis* as valid species but did not recognize *Anodonta wahlametensis*; they unfortunately misspelled the specific epithet of *Anodonta nuttalliana* as "*nuttaliana*" [sic], and this error has recently been proliferated in the literature as a result of others following this standard reference. Turgeon et al. (1998) corrected the earlier misspelling.

Chamberlin and Jones (1929) applied the common name "NUTTAL'S [sic] HIGH - WINGED FLOATER" to this species and, in so doing, misspelled Thomas Nuttall's name in the same way that Turgeon et al. (1988) later misspelled the specific epithet.

The subspecies of this species that occurs in Utah is presumed to be the type (or nominate) race, *Anodonta nuttalliana nuttalliana*, if the recognition of subspecies is in fact warranted in this species at all.

Status in Utah

Approximately 6 (or more) historical occurrences are known in Utah. It has been reported historically from Davis, Salt Lake, Utah, and Piute counties (Henderson 1924, Chamberlin and Jones 1929, and Jones 1940a). Although there are other historical Utah records of floaters (*Anodonta*) that may pertain to this species (e.g., Call 1884, Chamberlin and Jones 1929, Jones 1940a, Woolstenhulme 1942a), since they would add little or nothing to our knowledge of the Utah distribution of *Anodonta nuttalliana* and since there is doubt regarding their assignment to species, they are not considered here.

Call (1884) wrote of this species: "It is somewhat common in fresh-water streams near Salt Lake City." However, Call (1884) was including 3 other nominal species of floaters (*Anodonta*), 2 of these still recognized as valid by most authors (see, for example, Burch 1975 and Turgeon et al. 1988) and all three known from Utah, within his concept of *Anodonta nuttalliana*. Thus, it is not possible to determine whether his comment on the historical abundance of *Anodonta* actually applied to this species at all.

Jones (1940a) listed at least 7 Utah specimens but did not mention whether any of them were alive or even fresh when collected.

This species has not been reported in Utah since 1940 (Jones 1940a). Threats are believed to have included dewatering and alteration (i.e., degradation) of aquatic habitats. It is believed that this species is declining rapidly in Utah, if it is not already extirpated in the state. It is no longer extant at some of the historical localities (e.g., Utah Lake).

Inventory is needed throughout central Utah, especially along the Wasatch Front in areas of its former occurrence, to determine whether this species is extant in Utah.

Habitats Utilized in Utah

Chamberlin and Jones (1929), discussing this species in Utah, mentioned a shallow lake (viz., Utah Lake) and "in an old trout pond". Although Call (1884) wrote that the species occurred "in fresh-water streams near Salt Lake City" and that "specimens were dredged in Utah Lake", his concept of the species included other currently recognized species of floaters that occur in Utah, and thus his comments cannot be considered to refer only to this species.

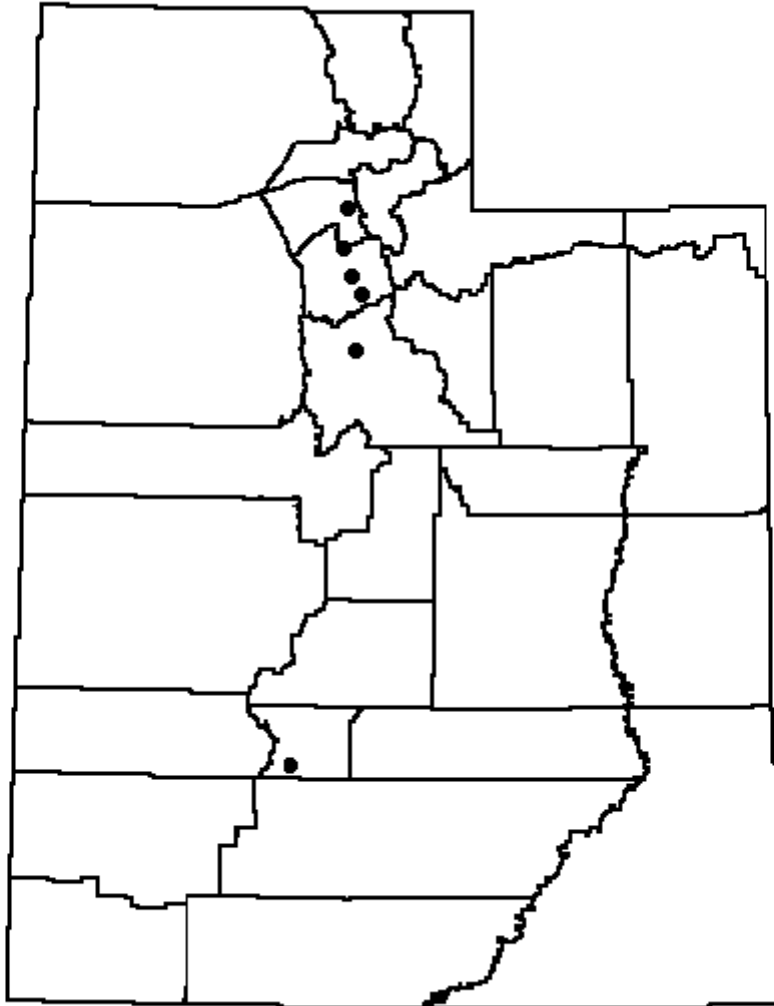


Figure 3. Utah localities for the winged floater (*Anodonta nuttalliana*) obtained from literature.

***Anodonta oregonensis* I. Lea, 1838**
Oregon floater

Utah Taxonomy

Except for Call (1884), who placed this and several other species of floaters in synonymy with *Anodonta nuttalliana*, which he reported from Utah Lake and from near Salt Lake City, all other authors who have discussed the species in Utah (e.g., Yarrow 1875, Ingersoll 1877, Chamberlin and Jones 1929, and Jones 1940a) have used its currently accepted name.

No subspecies are recognized in this species.

Status in Utah

About 3 historical occurrences of this species in Utah are known. This species is known from historical records in 3 counties in Utah: Davis, Salt Lake (probably), and Utah counties (Ingersoll 1877, Chamberlin and Jones 1929, Jones 1940a). Yarrow (1875), in the first report of the species from Utah, stated that the species was "[c]ollected from the Sevier River, Utah"; however, this is a rather imprecise locality, the Sevier River flowing through at least 6 Utah counties.

Although Ingersoll (1877) stated that this species was "[f]ound very abundantly" in Utah Lake, where there were "[m]any specimens living", the species is no longer extant in Utah Lake. Chamberlin and Jones (1929) reported 2 Utah specimens based on shells, apparently of recent origin, and mentioned as well "[l]iving specimens secured from a state fair exhibit." Jones (1940a) listed 1 Utah specimen. It is questionable whether the species still survives in Utah.

This species, if extant in Utah, is believed to be seriously threatened. Dewatering as well as alteration and degradation of aquatic habitats in north-central Utah, especially along the heavily populated and developed Wasatch Front in the very areas of its historical occurrence in Utah, are almost certainly factors that have led to its decline, if not extirpation, in this state. If this species still exists in Utah, it likely is declining rapidly.

Inventory is needed in central and north-central Utah, particularly along the Wasatch Front, to ascertain whether this species is extant in this state.

Habitats Utilized in Utah

Ingersoll (1877), reporting this species from Utah Lake wrote: "Found ... in the brackish water at the Southern extremity of Utah Lake in the soft mud." No other habitat information has been mentioned by authors discussing this species in Utah.

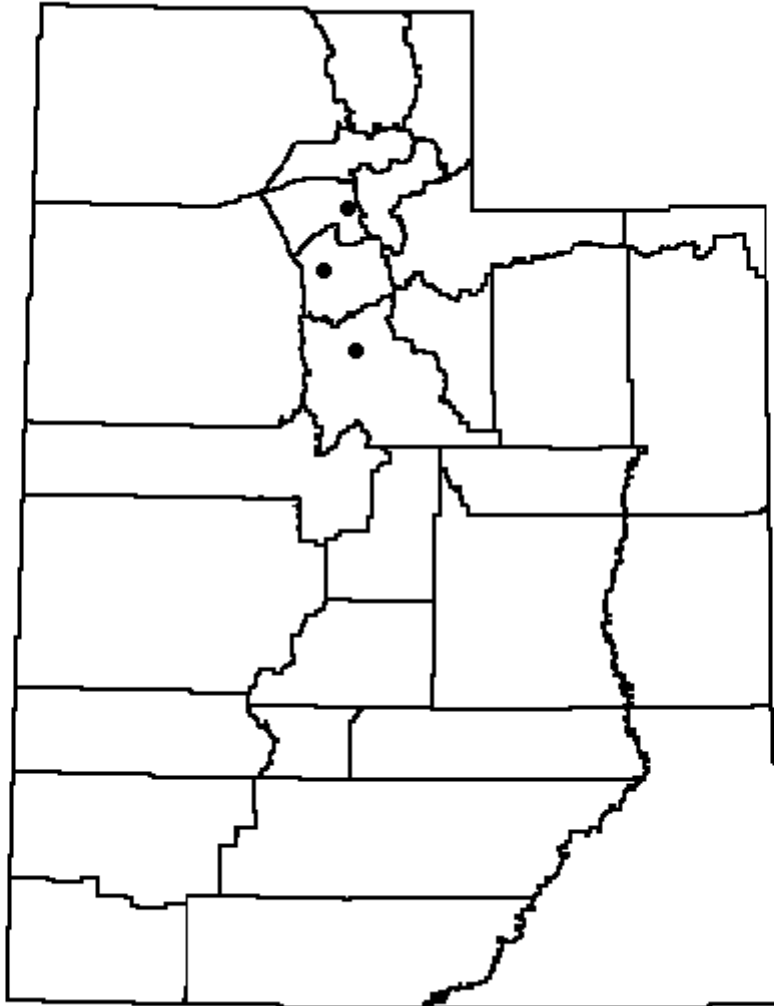


Figure 4. Utah localities for the Oregon floater (*Anodonta oregonensis*) obtained from literature.

***Tryonia protea* (Gould, 1855)** **desert tryonia**

Utah Taxonomy

This species has been allocated to various genera. Works dealing with Utah have assigned it to the genera *Melania* (see Yarrow 1875), *Paludestrina* (see Chamberlin and Jones 1929, Jones 1940a), *Hydrobia* (see Chamberlin and Roscoe 1948), and more recently *Tryonia* (see Russell 1971, Hershler no date).

A very old record of this species from Utah (Tryon in Ruschenberger 1873) also placed it in the genus *Tryonia*, as it is currently arranged, but tentatively assigned it to species as "probably *T[ryonia] exigua*", "of which *Melania protea*, Gould, is a synonym". Yarrow (1875) reported that Tryon had written to him of a specimen of this species collected in Utah, which Yarrow listed as "*?Tryonia exigua*", noting: "Mr. Tryon informs me this is probably *T. exigua*, Stimp., or else a new species. Unfortunately, not enough specimens were secured to establish the latter."

Chamberlin and Jones (1929) used the common name the cornucopia snail for the species.

Seemingly no subspecies have been proposed in this species.

Status in Utah

There are 9 known occurrences of this species in Utah. Chamberlin and Jones (1929) wrote, with regard to Utah: "Range.—Great Basin" Although Russell (1971) stated that this species occurs in "southern Utah", all known Utah localities are from the 3 adjacent counties Tooele, Utah, and Juab in north-central and west-central Utah: Juab County (6 sites at 1 locality, Russell 1971, also Hershler, no date), Tooele County (2 localities, Chamberlin and Jones 1929; 1 locality [probably the same as one in Chamberlin and Jones 1929], Jones 1940a; 3 localities, Hershler no date), Utah County (1 locality, Jones 1940a). These localities correspond well with Chamberlin and Jones' (1929) assertion that the species occurs in Utah within the Great Basin.

Tryon (in Yarrow 1875) reported an example of this species from the "shores of Sevier Lake [Millard County]". Since this specimen would have been drift material, of unknown age (possibly prehistoric, hundreds or even thousands of years old) and of unknown origin (undoubtedly washed into Sevier Lake and possibly from

almost anywhere in the Sevier River drainage, which takes in parts of at least 4 counties), the record is of little value.

Chamberlin and Jones (1929), writing of this species in Utah, stated that it is "rare". Hershler (no date) reported the species from 4 localities in Utah; for 2 of these 4 localities he indicated abundance of this species, in both cases stating it was "scarce". The few documented Utah occurrences and highly restricted habitat of this species suggest that it is of rather low abundance in Utah relative to other organisms.

Hershler (no date) reported this species at 4 localities in Utah; he considered disturbance to be slight at 2 of these sites, moderate at 1, and high at 1. Impacts noted by Hershler (no date) at these locations included recreational activities, the presence of livestock (trampling), and alteration of the aquatic habitat (one spring had been dug out). He also noted the presence of fish at 2 of the sites. Population trend of this species in Utah is not known.

Inventory elsewhere in the Great Basin portion of Utah is needed.

Habitats Utilized in Utah

Russell (1971) wrote: "Occurrence at Fish Springs [Juab County, Utah]: This species is generally found living in springs and spring outflows." Hershler (no date) provided habitat details for 4 Utah localities: Three of the sites were limnocrenes; 1 was a rheocrene. Elevations were 4,320 to 4,500 ft. Temperatures were 22, 26, 26, and 28 EC, all of which are rather warm temperatures for springs. Conductivities were 3,100, 9,300, 9,500, and 34,800 micromhos/cm; even the lowest of these (3,100 micromhos/cm) is high, and the highest (34,800 micromhos/cm) is extremely high.

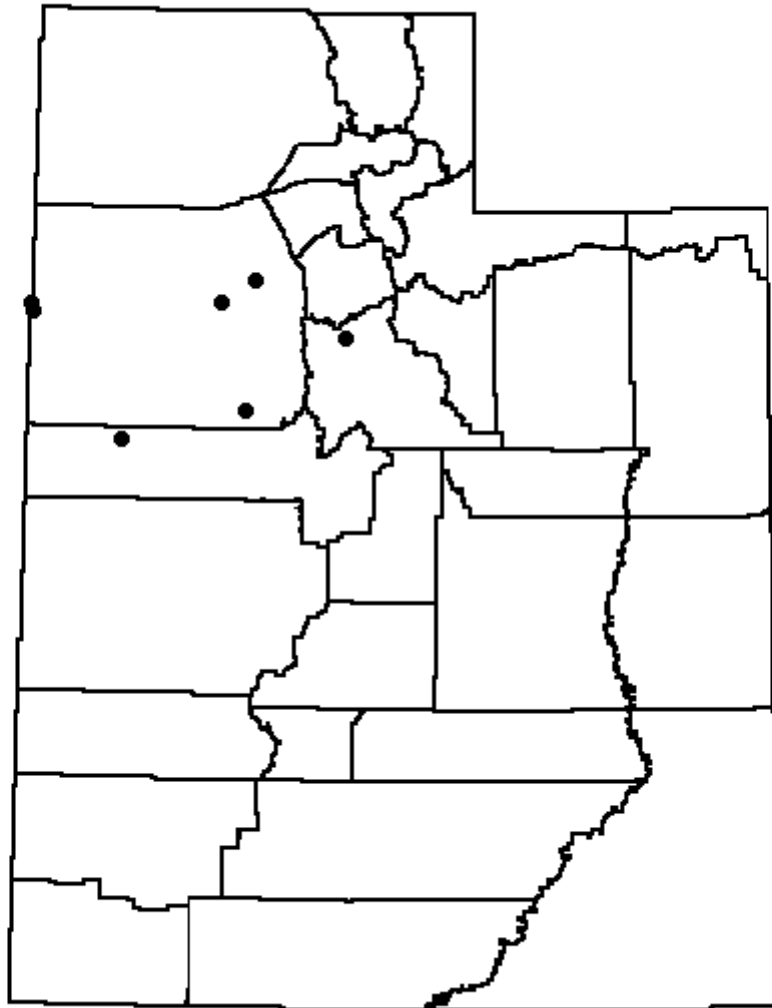


Figure 5. Utah localities for the desert tryonia (*Tryonia protea*) obtained from literature.

***Fluminicola coloradoensis* Morrison, 1940**
Green River pebblesnail

Utah Taxonomy

Specimens originally reported as *Fluminicola hindsii* and *Fluminicola fusca* have been referred by Hershler and Frest (1996) to this species, which they called "*Fluminicola coloradensis* [sic]". They noted that, though Morrison (1940), who described this species, included, in his concept of the species, snails from the Great Basin, significant morphological differences between the Green River and the Great Basin populations suggest that the Great Basin populations may represent one or more undescribed species. Hershler and Frest (1996), thus "have decided to restrict *F. coloradensis* [sic] to populations from the Green River."

No subspecies have been proposed in this species.

Status in Utah

Although Hershler and Frest (1996) stated the distribution of this species as "Upper Green River drainage, Wyoming" and mapped its range only in Wyoming, they examined 4 collections supposedly from Utah; there are questions concerning the locality data of all 4. It is questionable whether 2 of these collections are actually from Utah, the locality for both being "Head of Green River", which is far to the north of Utah in Wyoming. Perhaps the term was used loosely and what was meant was "upper Green River". Another Utah collection was from Emery County, but Hershler and Frest (1996) were "unable to confirm the Emery County, Utah, record, which is well downflow from other Green River sites for the species and may represent drift material (shells in this lot are worn and were collected empty)." The only other Utah record bears the ambiguous and perhaps indefinite locality "Green River" (Hershler and Frest 1996). Conceivably it could refer to the town of Green River and thus may be somewhat precise (and would corroborate the other Emery County record). However, it could equally well refer to the river itself, most of which is in Utah, where its course is hundreds of miles in length. Thus, while it seems that this species has been collected in the Green River drainage in Utah, there are no occurrences that can be precisely located.

Abundance of this species in Utah is unknown. Only 4 specimen lots from Utah have been reported (Hershler and Frest 1996), but the numbers of specimens in these lots were not provided.

Threats to this species in Utah are unknown. Alterations of the flow or degradation of the water quality of the Green River may be considered potential threats. Population trend in this species in Utah is unknown.

Surveys for this species in the Green River are needed in order to evaluate the status of this species in Utah.

Habitats Utilized in Utah

No habitat information for this species is available. Two of the Wyoming localities reported by Hershler and Frest (1996) are at bridges where highways cross the Green River.

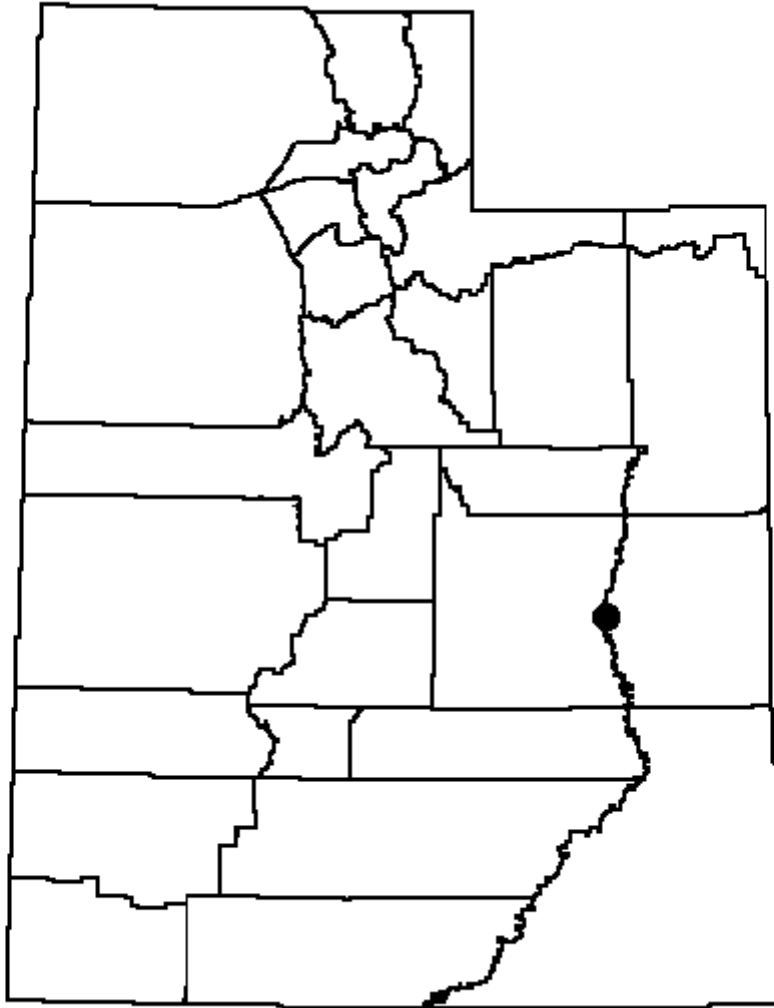


Figure 6. The Utah locality for the Green River pebblesnail (*Fluminicola coloradoensis*) obtained from literature.

***Fluminicola* sp.**
an unnamed pebblesnail

Utah Taxonomy

This snail has only recently been distinguished as specifically distinct from others and has not yet been named and described. It was "previously allocated (in the literature) to *F[luminicola] fuscus* (or its junior synonyms)" (Hershler no date), a species that Hershler and Frest (1996) have restricted to Columbia River system. Hershler (no date) has provisionally referred to the new species as *Fluminicola* new species 4.

No subspecies have been proposed in this new species, which itself has not yet been named.

Status in Utah

Hershler (no date) lists 7 occurrences of this species in Utah, where he has reported it from localized areas in 5 counties in north-central Utah: Rich, Cache, Morgan, Salt Lake, and Utah counties.

Hershler (no date) noted that this species was "common" at 2 Utah localities and "scarce" at 3 others; for the remaining 2 Utah localities no information concerning abundance is available.

For the 7 Utah occurrences Hershler (no date) noted disturbance ranging from "undisturbed" (1 occurrence) to "high" (2 occurrences). Sources of disturbance at these localities were: livestock, water diversions, proximity of residences, and recreation. Flow alterations and degradation of habitat thus are the main threats to this species in Utah. No trends are known for this as yet undescribed species.

Other populations should be sought in north-central Utah, particularly in areas between known localities (e.g., Weber and Davis counties) and in nearby areas (eastern Box Elder and western Summit and Wasatch counties).

Habitats Utilized in Utah

In Utah this species occurs primarily in rivers and streams. Water temperatures recorded by Hershler (no date) from this habitat type ranged from 8 to 16 EC, and conductivities ranged from 270 to 940 micromhos/cm. One Utah population,

however, inhabits a rheocrene with a temperature of 18 EC and conductivity measured at 2,300 micromhos/cm (Hershler no date). Elevations of the 7 localities range from 4,360 to 6,380 ft (Hershler no date).

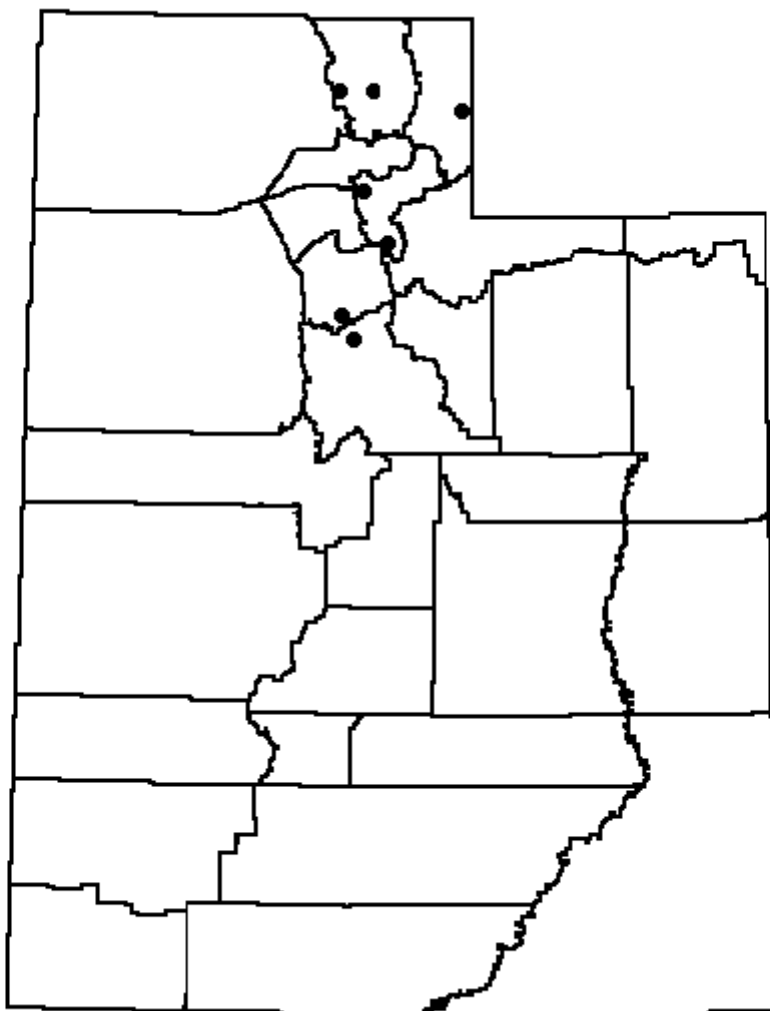


Figure 7. Utah localities for an unnamed pebblesnail (*Fluminicola* sp.) obtained from literature.

***Pyrgulopsis deserta* (Pilsbry, 1916)**
desert springsnail

Utah Taxonomy

This species was originally described by Pilsbry (1916b) in the genus *Amnicola* with the type locality given simply as "Washington County, Utah."

This species is monotypic.

Status in Utah

In Utah, this snail is known from 6 springs in Washington County, based on specimens collected in 1973 and 1977 (Hershler and Landye 1988).

Although population sizes have not been reported, Pilsbry (1916b), discussing this and related species found in this area, stated: "[C]olonies are small, few and widely separated."

Water diversions, enclosures, and other modifications of the springs inhabited by this species are potential threats, as are disturbance and degradation of the springs by livestock trampling or by human recreation. The rapid urban and agricultural development taking place in Washington County and the increasing demand for water in that area are more general threats. Population trends are unknown. Pilsbry (1916b), who named this species, stated: "It is a senile form, probably extinct or on the verge of extinction."

The status of known populations, not reported since material was collected in the 1970s, needs to be determined. Also, attempts should be made to locate additional populations in Washington County.

Habitats Utilized in Utah

All Utah records are from springs (see Hershler and Landye 1988); characteristics of these springs have not been reported.

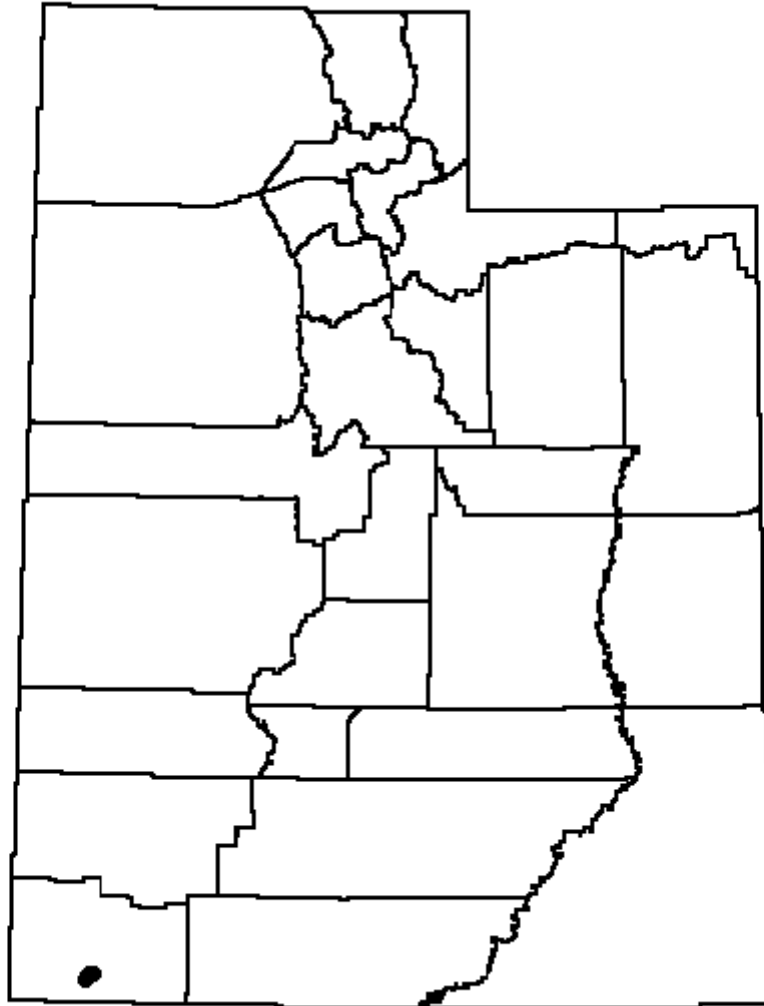


Figure 8. Utah localities for the desert springsnail (*Pyrgulopsis deserta*) obtained from literature.

***Pyrgulopsis pilsbryana* (J. L. Baily and R. I. Baily, 1952)**
Bear Lake springsnail

Utah Taxonomy

This species was originally described within the genus *Amnicola* by Baily and Baily (1952) from shells collected at Bear Lake.

No subspecies have been proposed in this species.

Status in Utah

In Utah this species is known from 3 springs in Rich County (Hershler 1998).

Hershler (no date) reported that this species is "common" in all 3 of the small springs from which it is known in Utah.

Hershler (no date) noted that all 3 of the localities inhabited by this species in Utah were disturbed, this disturbance being "high" in one case and "moderate" in the other 2. These disturbances were the result of trampling by livestock at one spring and diversion of water at another; the third spring was near a road.

Records of this species from Baily and Baily in 1952 are of shells only. No living snails of this species were reported Utah until the 1990s, when Hershler (no date, 1998) documented it as living in the state; therefore, trends cannot be addressed.

Inventory in springs not surveyed by Hershler (no date), particularly others within the Bear River and Bear Lake drainages in Rich County, could reveal additional populations of this species.

Habitats Utilized in Utah

All three localities described for this species are rheocrenes, springs flowing from the ground as streams. Temperatures measured at these springs range from 10 to 14 °C; the only conductivity reported was 508 micromhos/cm. Their elevations were reported as 5,740 to 6,120 ft (Hershler no date).

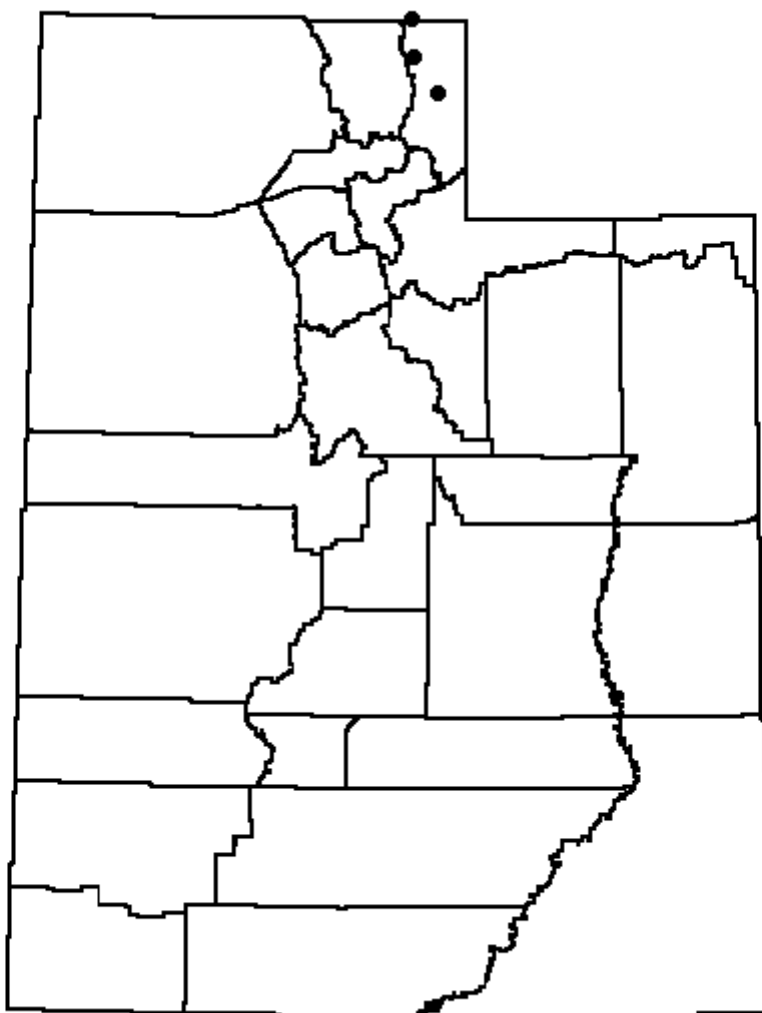


Figure 9. Utah localities for the Bear Lake springsnail (*Pyrgulopsis pilsbryana*) obtained from literature.

***Pyrgulopsis hamlinensis* Hershler, 1998**

Hamlin Valley springsnail

Utah Taxonomy

Hershler (no date) referred to this species as *Pyrgulopsis* new species 41. Hershler (1998) suggested the common name Hamlin Valley pyrg.

The type locality is "[s]prings, 0.5 km east of White Rock Cabin Springs, Hamlin Valley, Beaver County, Utah, T 30S, R 20W, SE 1/4 section 2"; the holotype, USNM 883215, was collected 9 May 1993 (Hershler 1998).

No subspecies have been proposed in this species.

Status in Utah

So far as is known, this species occurs only in one small complex of springs, 0.5 km east of White Rock Cabin Springs, in Hamlin Valley, Beaver County (Hershler no date, 1998).

Although Hershler (no date) considered this species to be "abundant" at the only known locality of its occurrence, relative to other organisms and in view of its extremely narrow endemism, its entire global population existing in a single small spring complex, its abundance must be considered very low.

Hershler (no date) considered the site inhabited by this species to be slightly disturbed and noted the presence of livestock and a residence. Elsewhere he stated (Hershler 1998) that the locality is "slightly impacted by cattle." Given that this species occurs, so far as is known, nowhere else, the known threat of trampling by cattle together with the potential threats suggested by the proximity of a residence must be considered serious threats that jeopardize to continued survival of the species. Population trend in this species is not known.

Prospective searches of other springs in the vicinity may be justified.

Habitats Utilized in Utah

Hershler (1998) described the only known locality for this species as "a small, high elevation rheocrene". Hershler (no date) reported the elevation of the locality to be 7,160 ft; he gave the temperature of the spring as 16 EC and its conductivity

as 209 micromhos/cm. Hershler (no date) added the note "mostly rocky substrate".

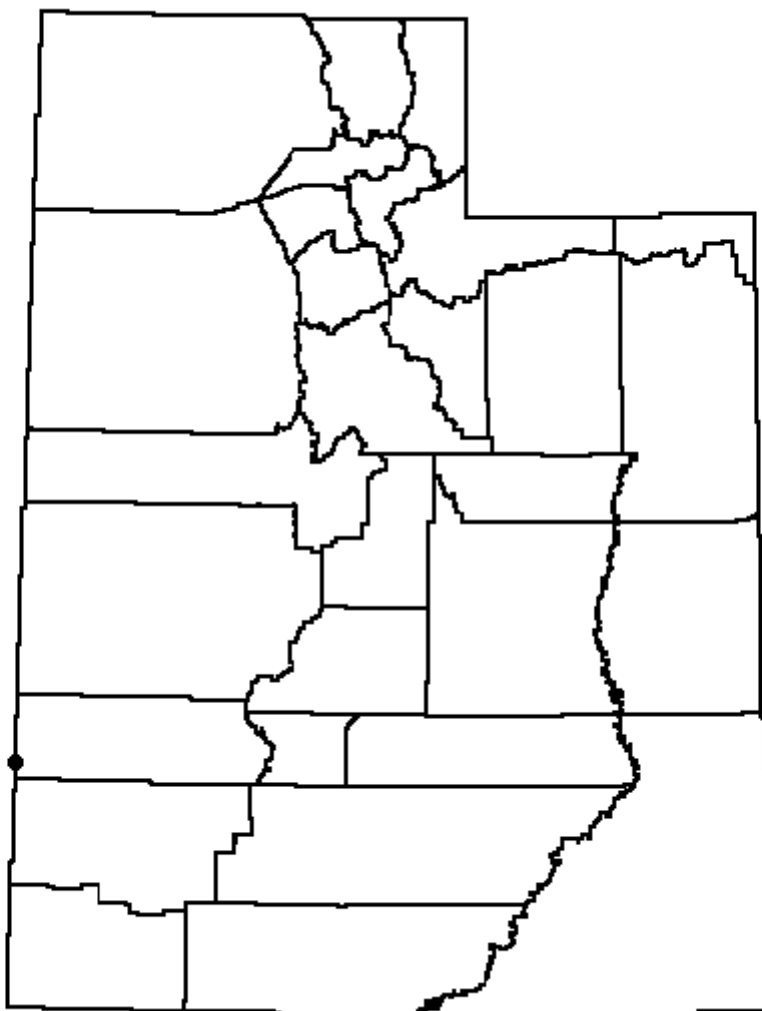


Figure 10. The Utah locality for the Hamlin Valley springsnail (*Pyrgulopsis hamlinensis*) obtained from literature.

***Pyrgulopsis peculiaris* Hershler, 1998**
bifid duct springsnail

Utah Taxonomy

In an unpublished report to the BLM, Hershler (no date) referred to this species as *Pyrgulopsis* new species 39. Hershler (1998) has suggested the common name bifid duct pyrg for it.

The type locality of this species is "Spring, Maple Grove, Round Valley, Millard County, Utah, T 21S, R 2 1/2W, NW ¼ section 1." The holotype, USNM 883933, was collected 11 May 1995.

No subspecies have been proposed in this species.

Status in Utah

This species is known in Utah from 6 springs in Millard County; only 2 localities are known outside of Utah, these being in White Pine County, Nevada (Hershler 1998).

At 2 of the known Utah localities, this species has been reported to be "scarce"; at 3 other Utah localities it has been reported as "common" (Hershler no date). However, these terms were from a work dealing with springsnails in the Great Basin and very likely are not comparable to their use in other, less ecologically restricted groups. Since the species is known in Utah from only 6 springs, its overall abundance in this state should be considered quite low relative to most other kinds of organisms.

Only 1 of the Utah occurrences was considered by Hershler (no date) to be undisturbed. At 3 of the springs disturbance was "slight", and at one spring disturbance was "moderate" (Hershler no date). At these 4 disturbed springs, diversion of the spring was noted at one, livestock were present at another, and recreational use was evident at 3 others. Thus, trampling by livestock, water diversion, and recreational use are the known threats to this species in Utah. Population trend in Utah is not known.

Further inventory of springs in Millard County could perhaps reveal the presence of other populations of this species.

Habitats Utilized in Utah

Hershler (1998) described the habitat of the type locality as "a small, montane rheocrene". Hershler (no date) listed 5 of the Utah localities (including the type locality) as rheocrenes. Their temperatures were 9, 10, 10, 11, and 12 EC. Conductivities were reported for 4 of the springs: 317, 438, 458, and 622 micromhos/cm. The reported elevations of the springs were 6,150 to 7,470 ft.

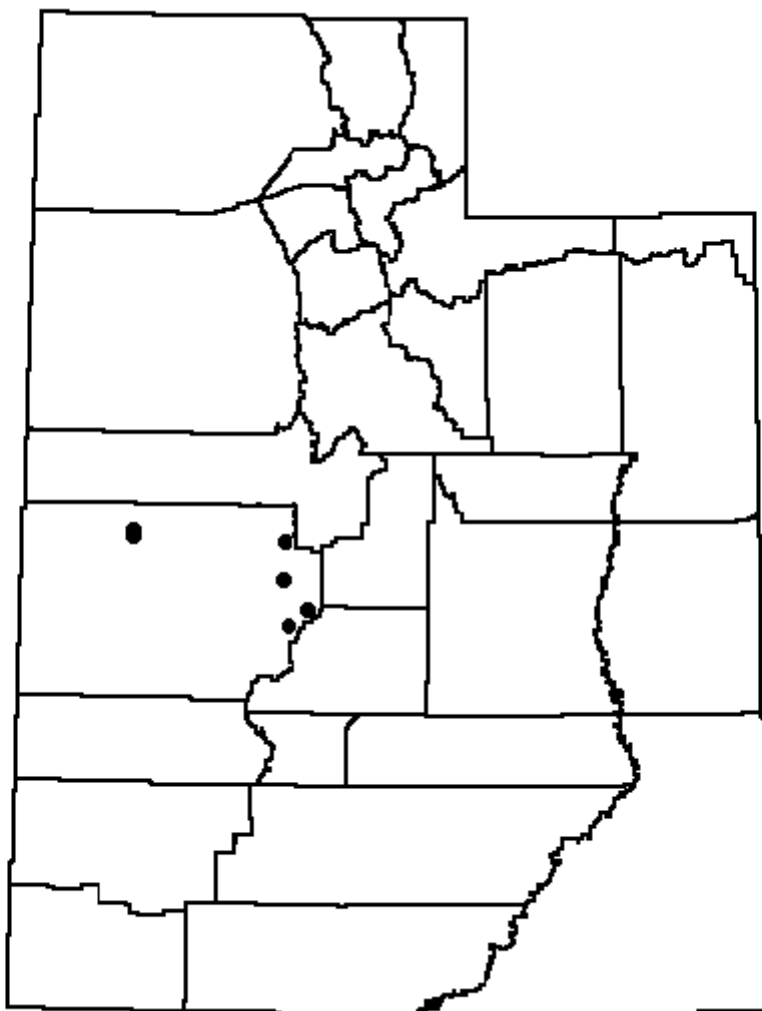


Figure 11. Utah localities for the bifid duct springsnail (*Pyrgulopsis peculiaris*) obtained from literature.

***Pyrgulopsis anguina* Hershler, 1998**

longitudinal gland springsnail

Utah Taxonomy

This species has been described and named by Hershler (1998), who suggested the common name longitudinal gland pyrg for it. He had provisionally referred to it as *Pyrgulopsis* new species 38 (Hershler no date) prior to formally naming it.

No subspecies have been proposed in this species.

Status in Utah

This species is known from only 2 springs in Snake Valley on the Utah–Nevada border. The one spring in Utah in which it occurs is Clay Spring in northwestern Millard County (Hershler 1998).

Although Hershler (no date) reported this species to be "common" at the one locality of occurrence in Utah, its limitation in this state to a single spring suggests that the Utah population must, despite its high local density, be quite small. It is likely, too, that Hershler (no date) was using the term "common" in the sense of "relative to other Great Basin springsnails", many of which are restricted to springs; thus, "common" for a Great Basin springsnail is probably not comparable to the meaning intended when this term is applied to species in other groups.

Hershler (no date) reported the level of disturbance of the one spring in Utah inhabited by this species to be high, and livestock were present at the spring. Furthermore, the spring "issues out of [an artificial, presumably concrete] box" and its "flow [is] mostly diverted to [an] irrigation ditch" (Hershler no date). The high level of disturbance, the presence of livestock, the alteration of the natural spring, and the diversion of its water for irrigation all must be considered threats to the species in Utah. Population trend in this species is unknown.

Prospective searches at other springs in Snake Valley are warranted.

Habitats Utilized in Utah

Hershler (no date) described the spring where this species occurs in Utah as a rheocrene having a temperature of 16 EC and conductivity of 450 micromhos/cm.

The spring "issues out of box, flow mostly diverted to irrigation ditch" (Hershler no date). The elevation of the site was given as 5,400 ft by Hershler (no date).

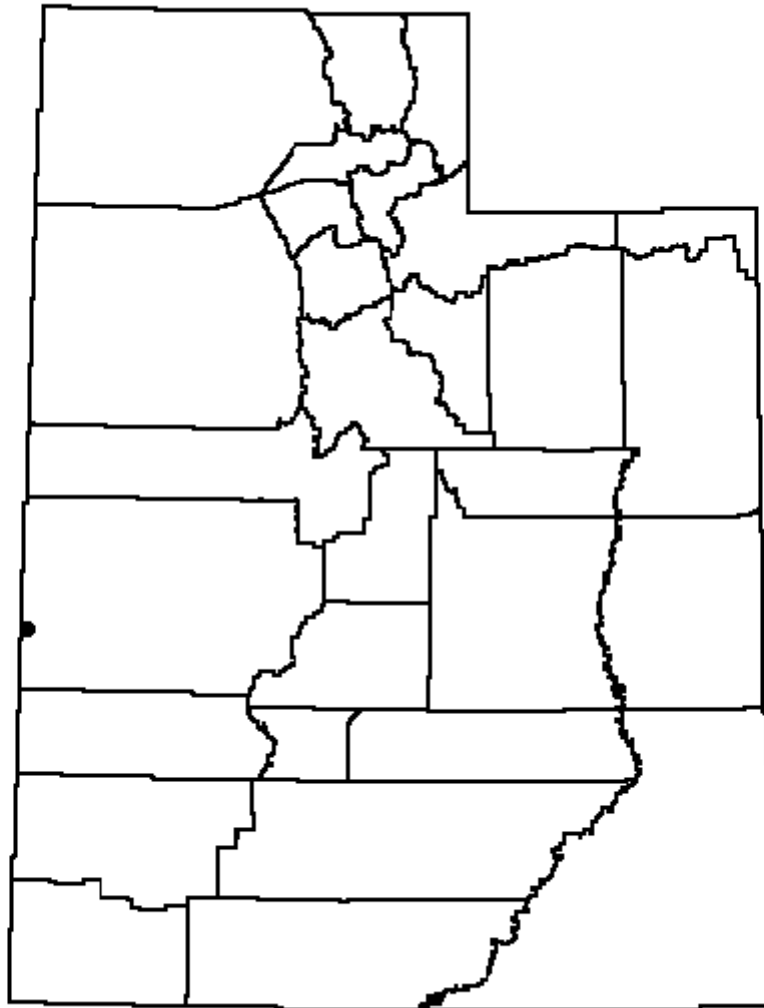


Figure 12. The Utah locality for the longitudinal gland springsnail (*Pyrgulopsis anguina*) obtained from literature.

***Pyrgulopsis saxatilis* Hershler, 1998**
sub-globose Snake springsnail

Utah Taxonomy

Hershler (1998) described this species as *Pyrgulopsis saxatilis* and has suggested the common name sub-globose snake pyrg.

The type locality (the only known locality) is "Warm Springs, Snake Valley, Millard County, Utah, T 16S, R 19W, SW 1/4 section 31". The holotype, USNM 883237, was collected 10 May 1993.

No subspecies of this species have been proposed.

Status in Utah

So far as is known, this species is entirely endemic to one locality: Warm Springs, Snake Valley, Millard County, Utah (Hershler no date, 1998).

Although Hershler (no date) reported this species to be "common" at this locality, since his report dealt only with Great Basin springsnails, this term must be considered as relative only to this group of organisms, and, since the entire world population of this species exists in only a single series of springs, its abundance compared with other organisms may be assumed to be low.

Hershler (no date) reported slight disturbance of the spring complex inhabited by this species and noted recreational use of the site. Recreation is, then, the only known threat to this species. However, since the spring complex apparently is at least in part owned as a source for public water, the possibility of dewatering and alteration of the spring complex may represent a potential threat. Population trend in this species is unknown.

Prospective searches at other suitable springs in Millard County may be justified.

Habitats Utilized in Utah

Hershler (1998) described the only known locality of occurrence as "a series of large, thermal (26.9E C.) rheocrenes issuing from the side of a hill." Hershler (no date), however, reported the temperature of the springs, at the outflow, as 27 EC.

Hershler (no date) recorded the conductivity of the spring water as 553 micromhos/cm, and gave the elevation of the site as 5,080 ft.

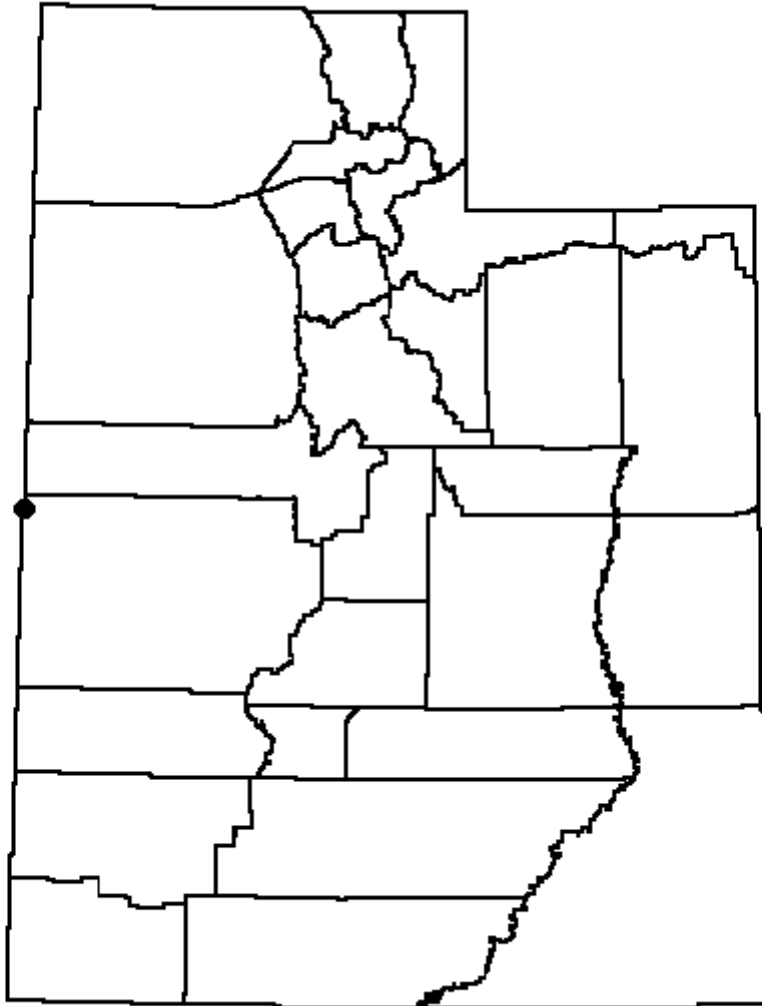


Figure 13. The Utah locality for the sub-globose Snake springsnail (*Pyrgulopsis saxatilis*) obtained from literature.

***Pyrgulopsis variegata* Hershler, 1998**

northwest Bonneville springsnail

Utah Taxonomy

This species was described by Hershler (1998). Pending formal naming, Hershler (no date) had previously referred to it as *Pyrgulopsis* new species 37 and *Pyrgulopsis* new species 48. Hershler (1998) has suggested northwest Bonneville pyrg as the common name for this species.

No subspecies have been proposed in this species.

Status in Utah

In Utah this species is known from 8 springs in far western Box Elder county and from 1 spring in extreme northwestern Tooele County (Hershler 1998).

In most of the springs inhabited by this snail in Utah, it has been reported to be common, though at one spring it was scarce and in another it was abundant (Hershler no date).

Fish introductions, habitat modification or degradation from water diversion and livestock watering or other alterations of the springs in which these snails are found could extirpate any of the known populations. Population trend is unknown in this species.

Searches for this snail in springs not surveyed by Hershler (no date, 1998) in northwestern Utah should be conducted. Periodic examinations at known localities would be of value in order to evaluate population trends.

Habitats Utilized in Utah

All but one of the known Utah populations of this species occur in rheocrenes, springs that emerge from the ground as flowing streams; the one Utah exception is in a helocrene, a spring in a marshy situation (Hershler no date). For these inhabited springs Hershler (no date) reported temperatures that ranged from 13 to 19 EC, and their conductivities were from 478 to 6,100 micromhos/cm. Elevations at these springs are 4,235 to 6,640 ft.

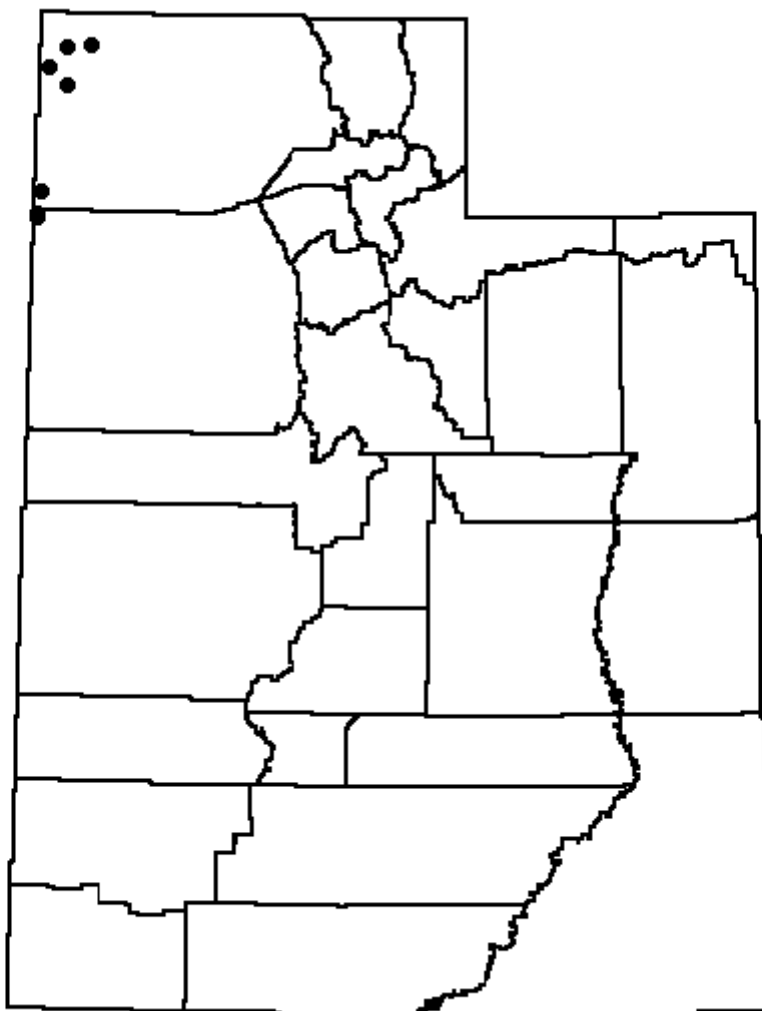


Figure 14. Utah localities for the northwest Bonneville springsnail (*Pyrgulopsis variegata*) obtained from literature.

***Pyrgulopsis plicata* Hershler, 1998**
Black Canyon springsnail

Utah Taxonomy

Hershler (no date) called this species *Pyrgulopsis* new species 42. Hershler (1998) described this species as *Pyrgulopsis plicata*, for which he suggested the common name Black Canyon pyrg.

The type locality of the species is "[s]pring, Black Canyon, East Fork Sevier River, Garfield County, Utah, T 32S, R 2W, NW ¼ section 11"; the holotype, USNM 883594, was collected 14 July 1993 (Hershler, 1998).

No subspecies have been proposed in this species.

Status in Utah

This species is known only from a complex of springs in Black Canyon, East Fork Sevier River, Garfield County, Utah, to which it is presumably strictly endemic (Hershler, no date, 1998).

Hershler (no date) listed this species as "common" at this locality. Its overall global abundance, however, must be extremely low, since it occurs in only one spring complex.

Hershler (no date) observed that disturbance of the only site where this species occurs is slight. He also (Hershler no date, 1998) noted that the spring complex inhabited by this species feeds a reservoir. Since the species is strictly endemic to one spring complex, even slight disturbance must be considered a serious threat to the species. Population trend is unknown.

Inventory of other springs in the area may be worthwhile.

Habitats Utilized in Utah

Hershler (1998) described the single locality of occurrence as "a large series of small rheocrenes emerging from a steep hillside". Hershler (no date) reported the elevation of the locality as 6,700 ft. He listed (Hershler no date) the temperature of these springs as 16 EC and the conductivity as 236 micromhos/cm.

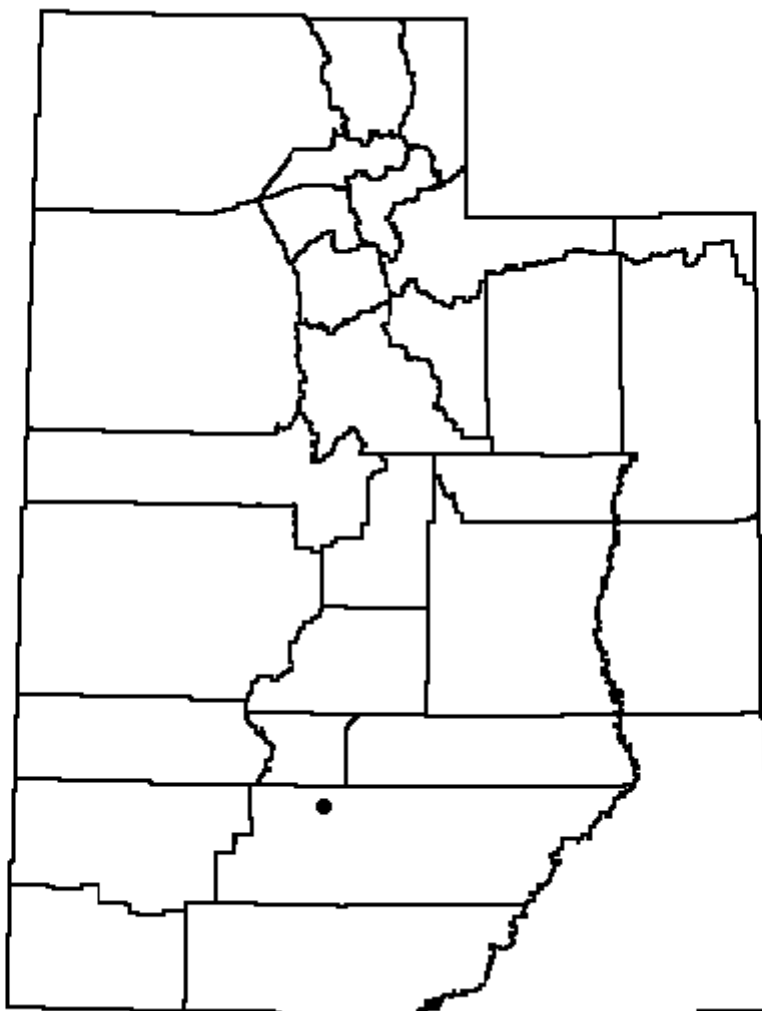


Figure 15. The Utah locality for the Black Canyon springsnail (*Pyrgulopsis plicata*) obtained from literature.

***Pyrgulopsis fusca* Hershler, 1998**
Otter Creek springsnail

Utah Taxonomy

Although Hershler (no date) considered this species to be merely a population of *Pyrgulopsis kolobensis*, Hershler (1998) described this as a new species, *Pyrgulopsis fusca*, and has suggested the common name Otter Creek pyrg for it.

The type locality of this species is "[s]pring brook, Otter Creek, ca. 1.6 km above The Narrows, Piute County, Utah, T 28S, R 1W, SW 1/4 section 17"; the holotype, USNM 883439, was collected 1 October 1993.

No subspecies have been proposed in this species.

Status in Utah

This species occurs only in 3 locations in south-central Utah: 1 in Piute County and 2 in Sevier County.

Hershler (no date) reported the abundance of this species at two of the three localities of its occurrence as "common". Since the species is restricted to three sites, its overall abundance relative to other organisms should be regarded as very low.

All three sites known to support this species were reported by Hershler (no date) to be slightly disturbed, two of them by livestock. Hershler (no date) noted that one of the sites is near a road. The restricted habitat and distribution of the species suggest that potential threats to its survival are likely very great. Population trend in this species is not known.

Inventory in the general area of the occurrence of this species may be of value.

Habitats Utilized in Utah

Hershler (1998) described the type locality as "a small brook (2 cm deep, 1 m wide), fed by numerous small springs, which enters Otter Creek." For another locality Hershler (no date) noted that "[the spring] runs about 7 m, enters creek". Hershler (no date) reported that all 3 of the localities of occurrence are

rheocrenes, their elevations ranging from 6,720 to 7,250 ft, temperatures 7 to 13 EC, and conductivities 190 to 200 micromhos/cm.

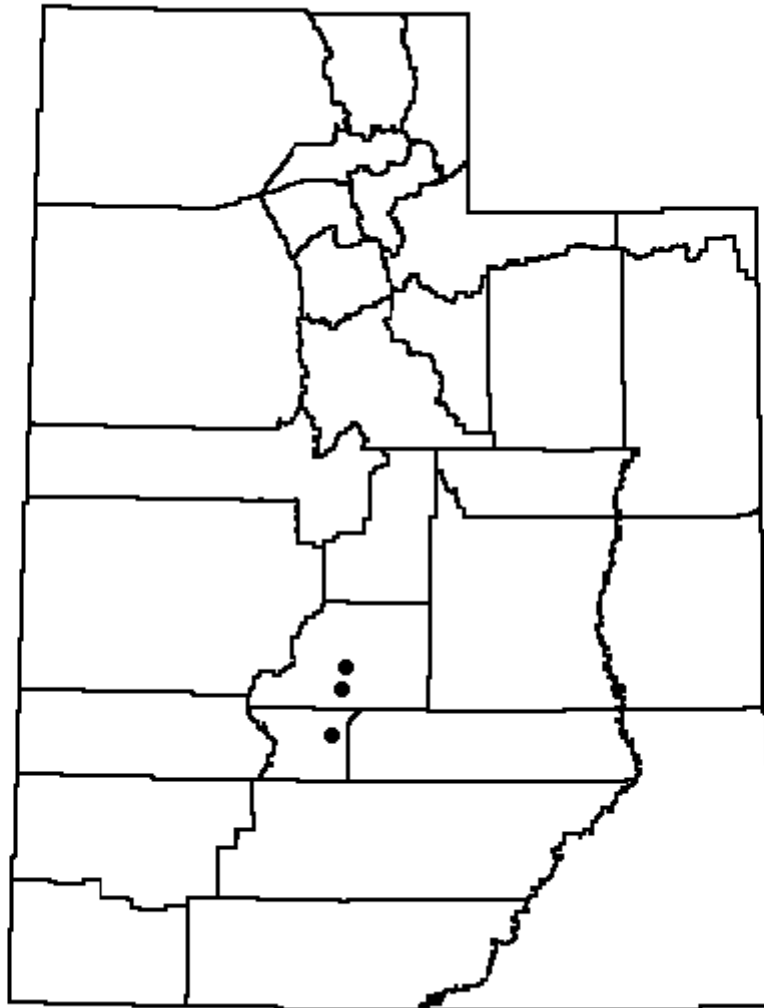


Figure 16. Utah localities for the Otter Creek springsnail (*Pyrgulopsis fusca*) obtained from literature.

***Pyrgulopsis chamberlini* Hershler, 1998**
smooth Glenwood springsnail

Utah Taxonomy

Hershler (no date) discussed this species as *Pyrgulopsis* new species 43. Hershler (1998) described the species as *Pyrgulopsis chamberlini*, for which he recommended the common name of smooth Glenwood pyrg.

The type locality is: "[s]pring, Glenwood, Sevier River drainage, Sevier County, Utah, T 21S, R 2W, NW 1/4 section 6. ... At Glenwood, two springs are found in a small drainage. An upper spring flows alongside HWY 119, while in a deeply entrenched area below, a second [spring] emerges amongst a thicket of downed trees. The type locality is the lower spring [T]his species also occurs in the upper spring" The holotype, USNM 883576, was collected 15 July 1993.

No subspecies have been proposed in this species.

Status in Utah

This species occurs only in two closely associated springs at Glenwood, Sevier County, Utah (Hershler no date, 1998).

Although this species was reported by Hershler (no date) to be "abundant" at the type locality, because it occurs only in two closely associated springs its overall abundance must be considered very low.

Hershler (no date) reported that the spring site inhabited by this species is highly disturbed and that there is recreational use of the site; Hershler (1998) noted as well that "[t]he type locality ... was highly impacted by recreational activities." The threat to the species is thus considered to be very high. Its population trend is unknown.

Prospective searches of other springs in the area may be of some value.

It is of interest that a congener, *Pyrgulopsis inopinata*, of this species likewise is strictly endemic to the same two associated springs in which this species occurs (Hershler 1998).

Habitats Utilized in Utah

Hershler (no date, 1998) has described the springs in which this species occurs as rheocrenes. He reported (Hershler no date) the temperature as 16 EC and the conductivity as 308 micromhos/cm; these measurements almost certainly pertain to the lower of the two springs, which, as quoted below, Hershler has noted as being more mineralized than the upper. The upper spring flows along state highway 119, and "in a deeply entrenched area below, a second, more mineralized rheocrene emerges amongst a thicket of downed trees" (Hershler 1998). Hershler (no date) added the note "dug-out; in deep trench", clearly in reference to the lower spring. The elevation of the locality is 5,580 ft (Hershler no date).

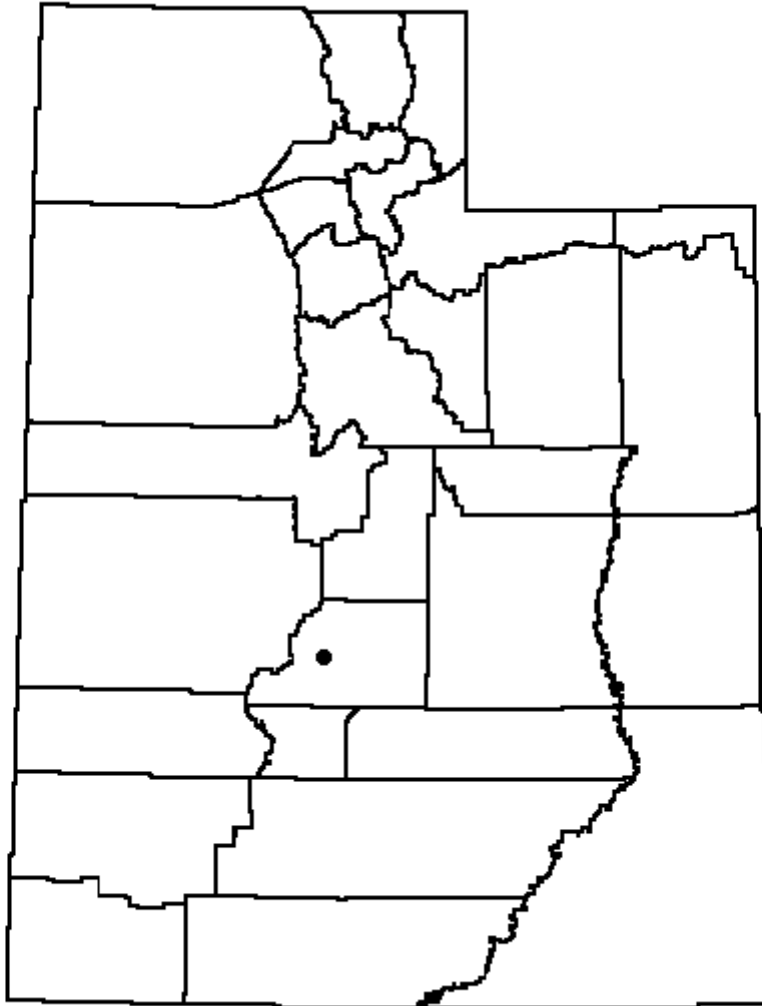


Figure 17. The Utah locality for the smooth Glenwood springsnail (*Pyrgulopsis chamberlini*) obtained from literature.

***Pyrgulopsis inopinata* Hershler, 1998**
carinate Glenwood springsnail

Utah Taxonomy

Hershler (no date) called this species *Pyrgulopsis* new species 44. Hershler (1998) described the species as *Pyrgulopsis inopinata* and suggested the common name carinate Glenwood pyrg for it.

The type locality for the species is "[s]pring, Glenwood, Sevier River drainage, Sevier County, Utah, T 23S, R 2W, NW ¼ section 36"; "[t]he type locality is the upper spring at Glenwood ..., which flows out of a pipe and forms a shallow brook" (Hershler 1998). The holotype, USNM 883943, was collected 10 May 1995.

No subspecies have been proposed in this species.

Status in Utah

This species is known from two springs at one locality in Glenwood, Sevier County, and from another spring 5.4 km south of Sigurd, Sevier County (Hershler no date, 1998).

Hershler (no date) reported that this species is "scarce" at the type locality; relative to other kinds of organisms, its overall abundance should be considered exceedingly low. It is known from only one other location not far from the type locality (Hershler 1998), and at this other locality of occurrence, there is the possibility that this species is hybridizing with another species, *Pyrgulopsis kolobensis* (Hershler 1998).

Hershler (no date) noted high disturbance and recreational use of the site that includes the type locality of this species. The known threat to the species is thus judged to be great. Its population trend is unknown.

Inventory of other springs in the Sevier County area may be useful.

This species coexists with a related species, *Pyrgulopsis chamberlini*, in the two closely associated springs at Glenwood, Sevier County, that are the type localities of both species (Hershler 1998).

Habitats Utilized in Utah

Hershler (no date) reported the habitat of this species at Glenwood as a rheocrene, temperature 16 EC, conductivity 308 micromhos/cm; the elevation of the Glenwood locality is 5,580 ft (Hershler no date).

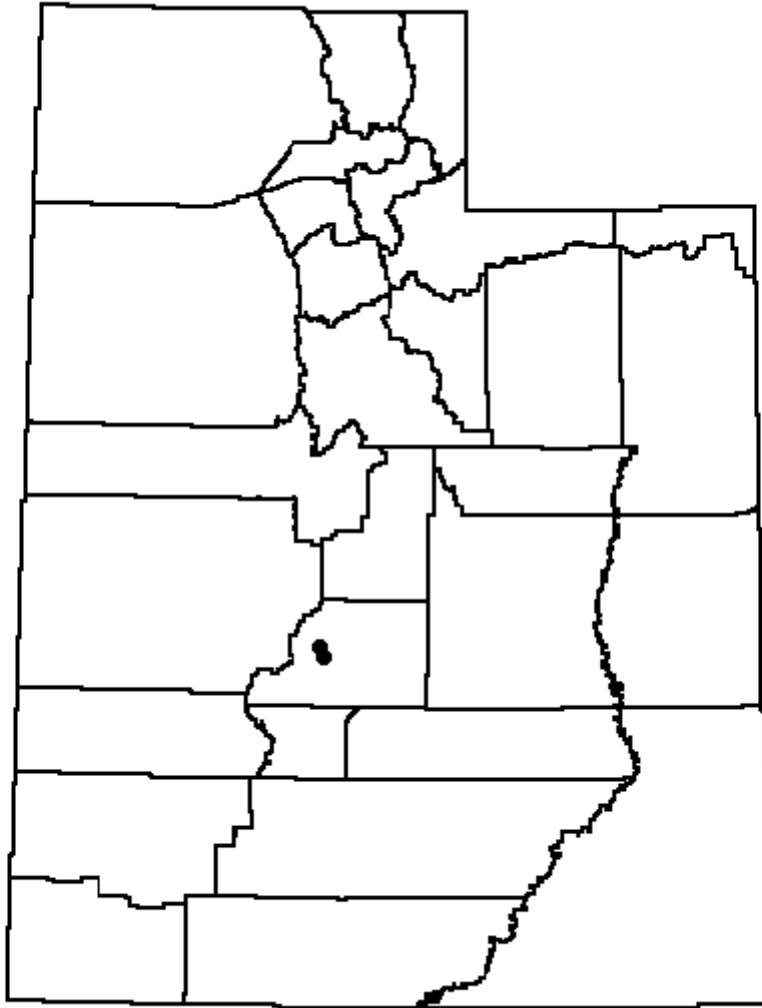


Figure 18. Utah localities for the carinate Glenwood springsnail (*Pyrgulopsis inopinata*) obtained from literature.

***Pyrgulopsis nonaria* Hershler, 1998**
Ninemile springsnail

Utah Taxonomy

Hershler (no date) called this species *Pyrgulopsis* new species 46. Hershler (1998) described the species as *Pyrgulopsis nonaria* and suggested the common name Ninemile pyrg for it.

The type locality for the species is "[s]pring, east side of Ninemile Reservoir, Sanpete Valley, San Pete [*sic*] County, Utah, T 19S, R 2E, NW ¼ section 9"; the holotype, USNM 883566, was collected 15 July 1993 (Hershler 1998).

No subspecies have been proposed in this species.

Status in Utah

This species occurs in 2 springs, not far apart, near Ninemile Reservoir, Sanpete County (Hershler no date, 1998).

Hershler (no date) noted that this species is "abundant" in one of the two springs. However, its overall population, compared with other organisms, must be very low due to its extremely restricted habitat and distribution.

Hershler (no date) reported disturbance of one of the two known sites inhabited by this species, the type locality (Hershler 1998), to be "slight". However, the limited occurrence of this species and the vulnerability of its habitat suggest that potential threats to the species are great. Population trend in this species is unknown.

Inventory of other springs near Ninemile Reservoir may be of use.

Considering the proximity to Ninemile Reservoir of the two springs inhabited by this species, it is possible that the filling of the reservoir may have destroyed other occurrences of the species by inundating springs in which they occurred.

Habitats Utilized in Utah

Hershler (1998) wrote: "The type locality is a shallow, broad, mineralized (1213 micromhos/cm) rheocene emptying into Ninemile Reservoir." Hershler (no date)

reported the temperature of this spring (the type locality) as 12 EC and its elevation as 5,540 ft.

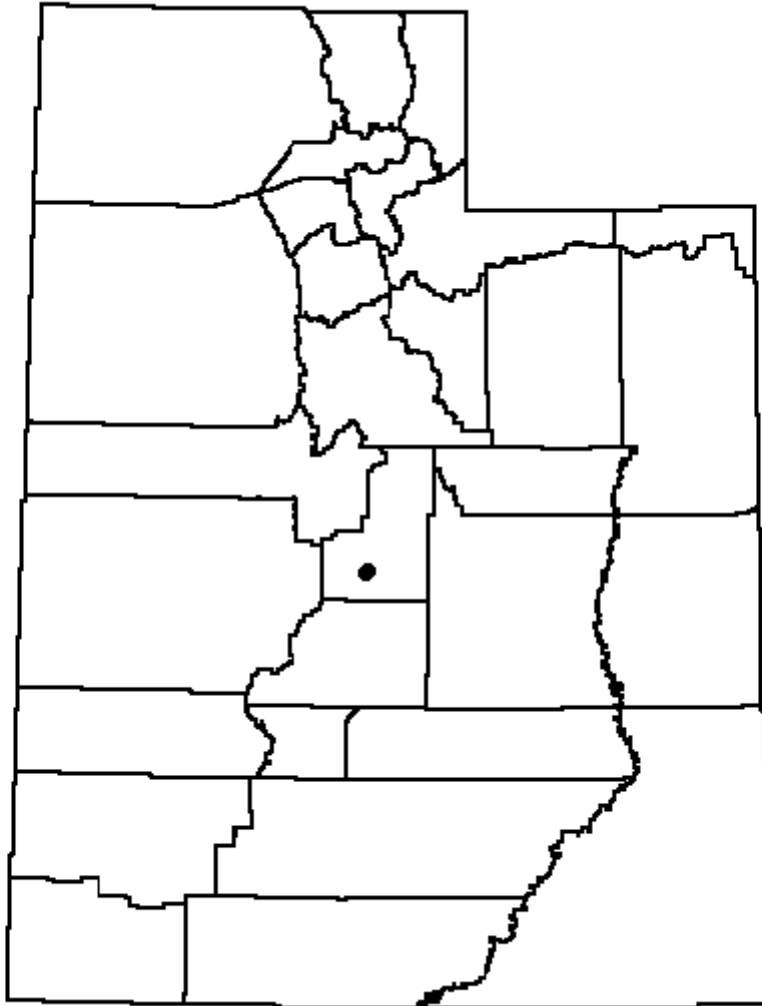


Figure 19. Utah localities for the Ninemile springsnail (*Pyrgulopsis nonaria*) obtained from literature.

***Pyrgulopsis transversa* Hershler, 1998** **southern Bonneville springsnail**

Utah Taxonomy

Hershler (no date) referred to this species as *Pyrgulopsis* new species 45, *Pyrgulopsis* new species 47, and (probably) *Pyrgulopsis kolobensis*. Hershler (1998) described this species as *Pyrgulopsis transversa*, for which he recommended the common name southern Bonneville pyrg.

The type locality for this species is "[s]prings south of Footes Canyon, Simpson Mountains, Old River Bed, Tooele County, Utah, T 10S, R 8W, NW 1/4 section 33"; the holotype, USNM 883221, was collected 12 May 1993.

No subspecies have been proposed in this species (i.e., the species is monotypic).

Status in Utah

This species is known from 6 springs, all being in north-central Utah. Four of these localities are in Tooele County, and there is 1 locality each in Utah County and in Sanpete County (Hershler 1998).

Hershler (no date) indicated the abundance of this species at 2 of the 6 known localities as "common" and at two others as "abundant". Despite the fact that it is "abundant" at two of the sites, the restriction of the species under consideration to 6 springs implies a very low population relative to other organisms.

Of the 6 known localities for this species (Hershler 1998), Hershler (no date) has provided information concerning the condition and threats at 5: Four of these sites are moderately disturbed, and one is highly disturbed. At 3 of the springs, livestock were present; there was also a residence near one of these springs. One of the springs had been dug out, and another possibly so, and both of these springs flow into reservoirs or an impoundments. Trampling by livestock and alteration of the springs are, then, known threats to the species. Population trend in this species is not known.

Inventory of other springs in the Tooele–Utah–Sanpete county area may be of value.

Habitats Utilized in Utah

Hershler (1998) wrote: "The type locality is a series of small, mineralized (1126 micromhos/cm) springs at about 1778 m elevation. The spring sampled is a small 'rheocrene' issuing out of a pipe" Hershler (no date) reported habitat information for 5 of the 6 known localities for this species, 1 of these 5 being the type locality already mentioned. He designated 4 of the springs rheocrenes and one a helocrene. Their elevations were reported as 5,830 to 6,740 ft. Their temperatures were 12, 12, 12, 13, and 16 EC, and their conductivities were 360, 463, 500, 889, and 1,126 micromhos/cm.

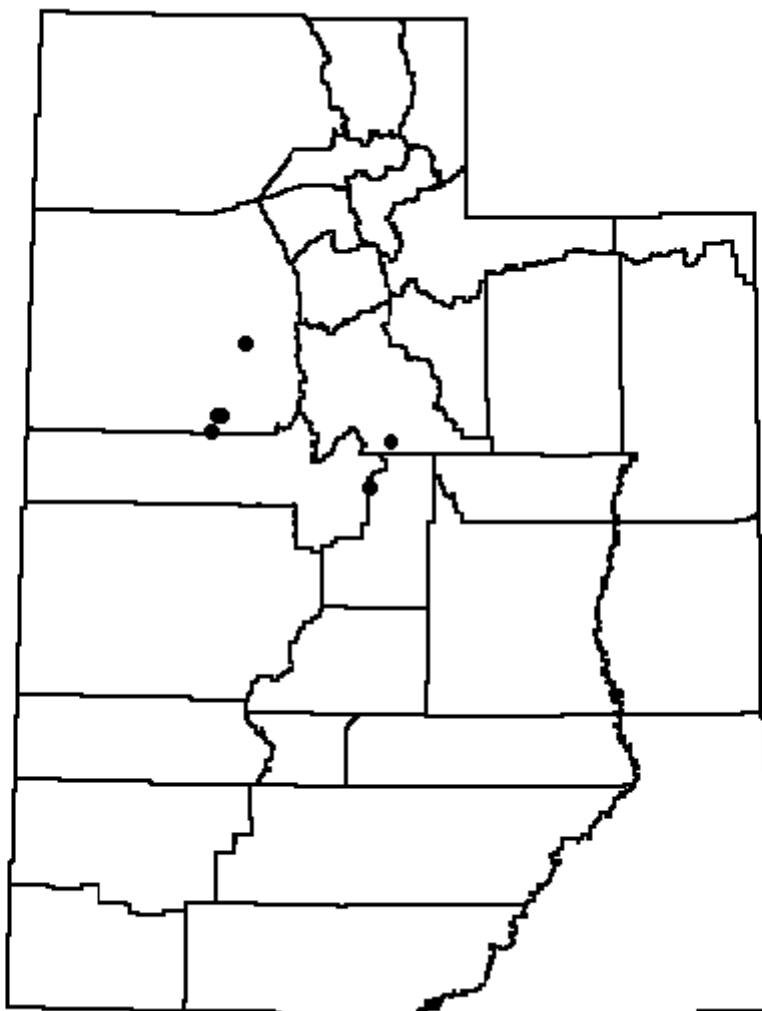


Figure 20. Utah localities for the southern Bonneville springsnail (*Pyrgulopsis transversa*) obtained from literature.

***Amnicola limosus* (Say, 1817)**
mud amnicola

Utah Taxonomy

All authors who have commented on this species in Utah (e.g., Pilsbry 1899, Henderson and Daniels 1917, Chamberlin and Jones 1929, Jones 1940a, 1940b; Woolstenhulme 1942a, Chamberlin and Roscoe 1948) have referred to it as *Amnicola limosa*, the specific epithet containing a gender error that has since been corrected.

The race of this species that occurs in Utah is the type race, *Amnicola limosus limosus* (see Burch 1989).

Status in Utah

Five historical occurrences of this species in Utah are known. (Prehistoric occurrences, based on subfossil material, have been excluded.) These localities are in the central or north-central part of the state. Reports that are thought to represent historical occurrences (and not merely prehistoric material) are from Utah County (Pilsbry 1899, Henderson and Daniels 1917, Chamberlin and Jones 1929, Jones 1940a), Salt Lake County (Woolstenhulme 1942a), Tooele County (Jones 1940b), and Juab County (Chamberlin and Jones 1929); however, populations at some of these historical localities are now known to be extirpated. It should be noted that many of the reports of this species from Utah are based upon subfossil or fossil material; for example, the species is well known from Box Elder County as fossils.

Abundance of this species at most reported localities in Utah is not well known, even historically. The question of its historical abundance in Utah is clouded by the fact that many authors did not explicitly distinguish dead shells from living individuals in their reports, and a few did not distinguish prehistoric (i.e., subfossil and fossil) material from fresh specimens. Jones (1940b) reported "several, alive" from one locality in Utah. Jones (1940a) reported from another Utah locality collections of 4, 2, and "several", and from still another locality 3 specimens; he seemed to be referring to fresh material as opposed to fossils or subfossils. Although Chamberlin and Jones (1929) wrote that "*Amnicola limosa* is a common form in Utah Lake", this is no longer true, the species seemingly having completely disappeared from this locality since the time of their publication. Chamberlin and Jones (1929) mentioned 1 specimen at another locality, and Woolstenhulme

(1942a) reported 3, both of these reports possibly representing fresh, if not living, examples of the species. The apparent extirpation of this species from Utah Lake and the small numbers reported from other localities suggest that the species is now rare in Utah.

Threats to this species in Utah have included and almost certainly continue to include alteration and degradation of aquatic sites, especially in the heavily populated region along the Wasatch Front. Draining of wetlands and development of these former wetlands for agricultural, industrial, and commercial and residential purposes has resulted in widespread loss of habitat for this species. Dewatering for agricultural irrigation may also be a threat. Pollution from agricultural chemical use, industrial effluent, sewage, and mosquito abatement activities are other likely threats to the species.

This species is known to have declined precipitously in abundance and distribution in Utah during this century. It no longer survives at many of the localities where it was formerly found as a living species (e.g., Utah Lake and surrounding localities). Some of the aquatic sites from which it was formerly collected have, in fact, been destroyed (e.g., Beck's Hot Springs near Salt Lake City).

Inventory is needed to ascertain the current status of this species in central Utah: its currently occupied range and its abundance.

It is very important to distinguish between prehistoric (i.e., subfossil and fossil), fresh (dead), and living specimens of this species in Utah when examining pertinent literature, museum specimens, and examples encountered in the field.

Habitats Utilized in Utah

Although Chamberlin and Jones (1929) stated that "[t]his species occurs ... in streams, rivers and more quiet bodies of water ... on muddy bottoms and aquatic plants", it appears that they were writing in general terms concerning the species rangewide rather than of the particular habitats that it utilizes in Utah; for example, no information has been found that suggests that the species has ever been identified from streams or rivers in Utah. The species formerly occurred in Utah Lake, a large, shallow, slightly saline, freshwater lake where Chamberlin and Jones (1929) clearly were familiar with it, but several reported Utah localities are springs (see, for example, Jones 1940a) or salt springs (see, for example Woolstenhulme 1942a), habitats that Chamberlin and Jones (1929) did not mention, though they were aware of spring localities.

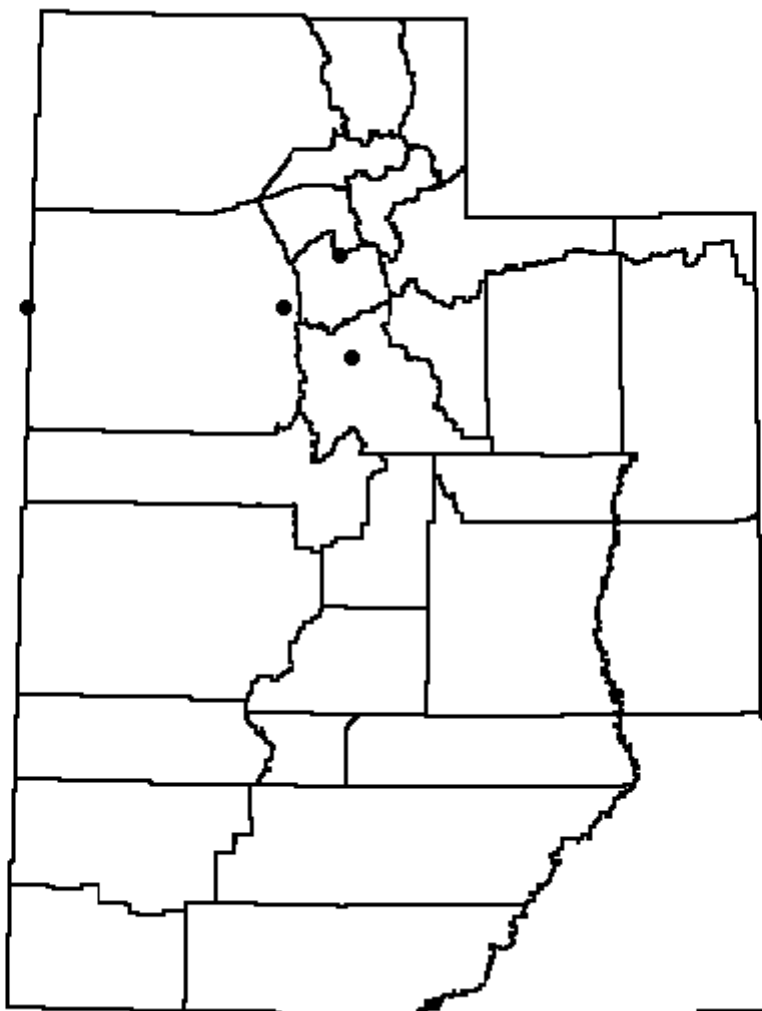


Figure 21. Utah localities for the mud amnicola (*Amnicola limosus*) obtained from literature.

***Lyogyrus greggi* (Pilsbry, 1935)**
Rocky Mountain duskysnail

Utah Taxonomy

Although this species was formerly placed in the genus *Amnicola*, the only report that deals with it in Utah (Hershler no date) uses its currently accepted name.

No subspecies have been proposed in this species.

Status in Utah

In Utah, this species occurs only in 2 springs in Cache County (Hershler no date). Hershler (no date) noted this species as "common" in each of the 2 springs.

Both springs receive moderate disturbance from recreation (Hershler no date). Any activities that modify the habitats of these 2 springs could potentially jeopardize the existence of this species in Utah.

Population trends are unknown for this species, only recently discovered in Utah (Hershler no date). Inventories of other springs in northern Utah, particularly in the vicinity of the known Cache County localities, could reveal the presence of other populations.

Habitats Utilized in Utah

Both localities known for this species are rheocrenes, springs flowing from the ground as streams. The temperature at one of the springs was 5 EC; at the other locality, the temperature was 8 EC and the conductivity was 290 micromhos/cm (Hershler no date).

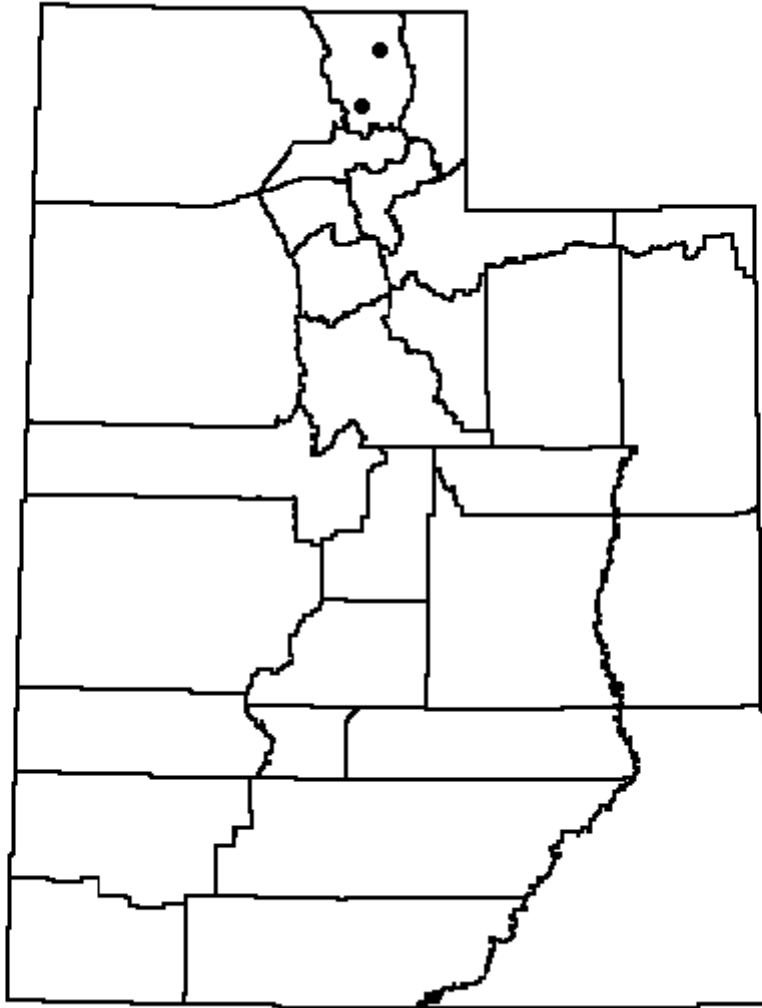


Figure 22. Utah localities for the Rocky Mountain dusksnail (*Lyogyrus greggi*) obtained from literature.

***Valvata humeralis* Say, 1829**

glossy valvata

Utah Taxonomy

Henderson and Daniels (1917) commented that Yarrow's (1875) and Ingersoll's (1876) Utah records of *Valvata sincera* probably should be referred to *Valvata humeralis*. According to Taylor (1986), Russell (1971) misidentified this species as *Valvata utahensis*.

The subspecies found in Utah is *Valvata humeralis californica*.

Status in Utah

At least 12 Utah occurrences of this species have been reported in the literature. All reported localities for this species in Utah are from the central and western parts of the state. Chamberlin and Jones (1929) documented this species in Kane, Sevier, Utah, Wasatch, Rich, and Box Elder counties. Jones (1940a) provided an additional locality in Utah County. Woolstenhulme (1942a) reported material from Tooele County. The only recent report of the species in Utah is from Fish Springs National Wildlife Refuge in Juab County (Taylor 1986).

Although some authors (e.g., Chamberlin and Jones 1929) have listed records of this species from Salt Lake County, most or all of these records are very old (Yarrow 1875, Ingersoll 1876) and were assigned in the original sources to another species, *Valvata sincera*, now considered to occur only in northeastern North America. Although these early records probably do apply to *Valvata humeralis* as Henderson and Daniels (1917) opined and *Valvata humeralis* probably did formerly inhabit Salt Lake County, this has not been persuasively demonstrated and must be regarded as speculative.

Chamberlin and Jones (1929) noted that this species was "plentiful" at Fish Lake, Sevier County. Jones (1940a) listed Utah collections of 5, 5, and "several", and, although he did not indicate whether any of these had been collected live, he seemingly was distinguishing these from fossil or subfossil material. Woolstenhulme (1942a, 1942b) also reported 2 Utah collections of "several". Taylor (1986) found 440 live individuals and numerous empty shells of this species at one locality.

Threats to this species in Utah almost certainly include alterations and elimination of aquatic habitat. Introductions of aquatic organisms such as fishes and other

species of mollusks may also represent threats to this species. Population trend in Utah is not known.

Sites of all known historical occurrences of this species in Utah should be revisited in order to determine its current status in the state.

Habitats Utilized in Utah

This species has been found in ditches, spring outflows, and spring source pools at Fish Springs National Wildlife Management Area (Taylor 1986). It has also been reported in Utah from several lakes and a reservoir (Chamberlin and Jones 1929, Chamberlin and Berry 1930).

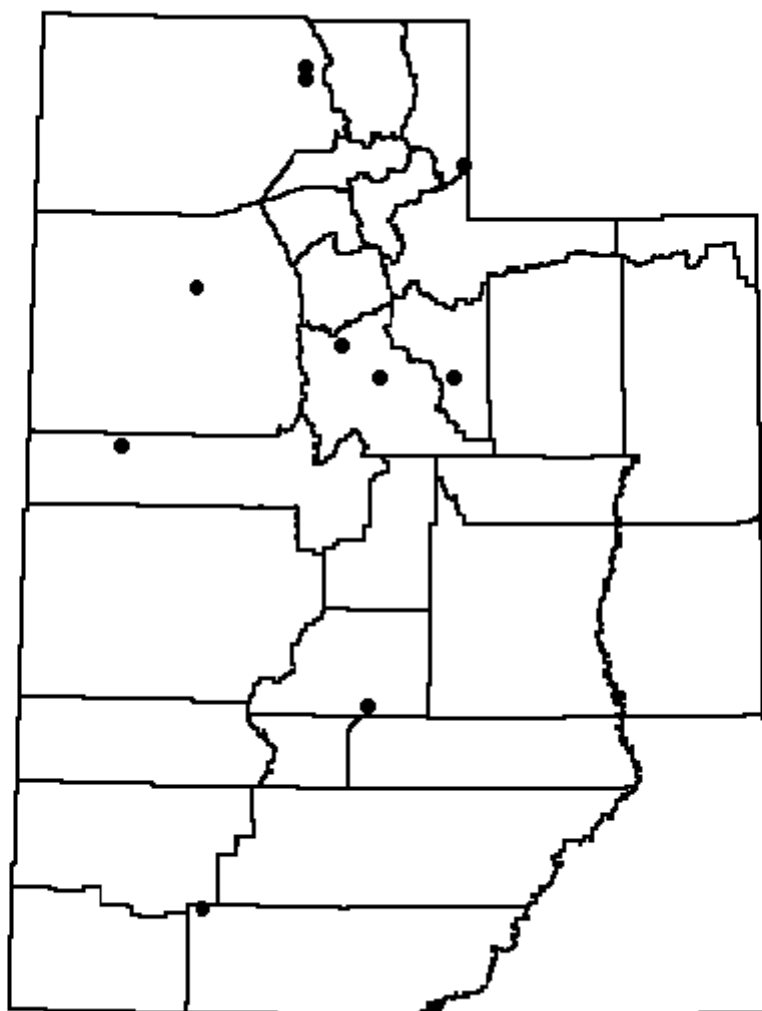


Figure 23. Utah localities for the glossy valvata (*Valvata humeralis*) obtained from literature.

***Valvata utahensis* Call, 1884**

desert valvata

Utah Taxonomy

Call (1884) arranged *utahensis* as a variety of *Valvata sincera* in the original description, the type locality being "Lake Utah, Utah."

No subspecies are currently recognized in this species.

Status in Utah

Call (1884) reported the only Utah population of this species, now extirpated. This species was found historically in Utah Lake, seemingly living in 1883 (see Call 1884). All other Utah localities for the species are based either on prehistoric (i.e., fossil or subfossil) material or on misidentifications. For example, as recently as 1971 Russell (1971) reported living examples of this species from Fish Springs in Juab County, but this record proved to be a misidentification of *Valvata humeralis* (Taylor 1986).

Call (1884) wrote of this taxon: "It is a very abundant shell at the north end of Utah Lake at Lehi", and "This form was dredged in August, 1883, in great numbers in Utah Lake, near Lehi, not far from the head of the River Jordan." The latter statement suggests that Call may have found the species alive in 1883. Also, as Henderson (1931) pointed out, the fact that Call described the operculum of *Valvata utahensis* from Utah Lake suggests that he had collected it alive. Henderson and Daniels (1917), reporting their findings at Utah Lake, 2 miles south of Lehi, noted that "[v]ery few live mollusks were found except *Succinea*, but dead shells were abundant", including this species. Chamberlin and Jones (1929) discussing this species commented: "This form is plentiful in Utah Lake; but in all our collecting we did not find a living specimen." The species is now considered extirpated in Utah (Clarke 1991), and it appears that its extirpation occurred sometime around the turn of the century.

Various anthropogenic alterations of the aquatic environment may have extirpated this and other species (i.e., virtually all mollusks and several fishes) formerly found in Utah Lake, which, though originally a natural lake, has long been managed as a reservoir. Causes of the extinctions and extirpations of the formerly diverse molluscan fauna of Utah Lake are much more puzzling than those that led to the demise of the lake's ichthyofauna and probably will never be understood.

The existence of a few populations of this species in Idaho suggests that there is the remote possibility that a remnant population could be found in Utah. In the unlikely event that this were found to be so, such a population would almost certainly be somewhere in the northwestern quarter of the state.

This species is known from fossil material at other Utah localities (e.g., Bear Lake).

Habitats Utilized in Utah

In Utah, this species occurred historically in Utah Lake, a large, shallow, slightly alkaline, freshwater lake. Fossil material shows that it occurred prehistorically in Utah in other lakes (e.g., Bear Lake) and perhaps rivers (e.g., the Bear River).

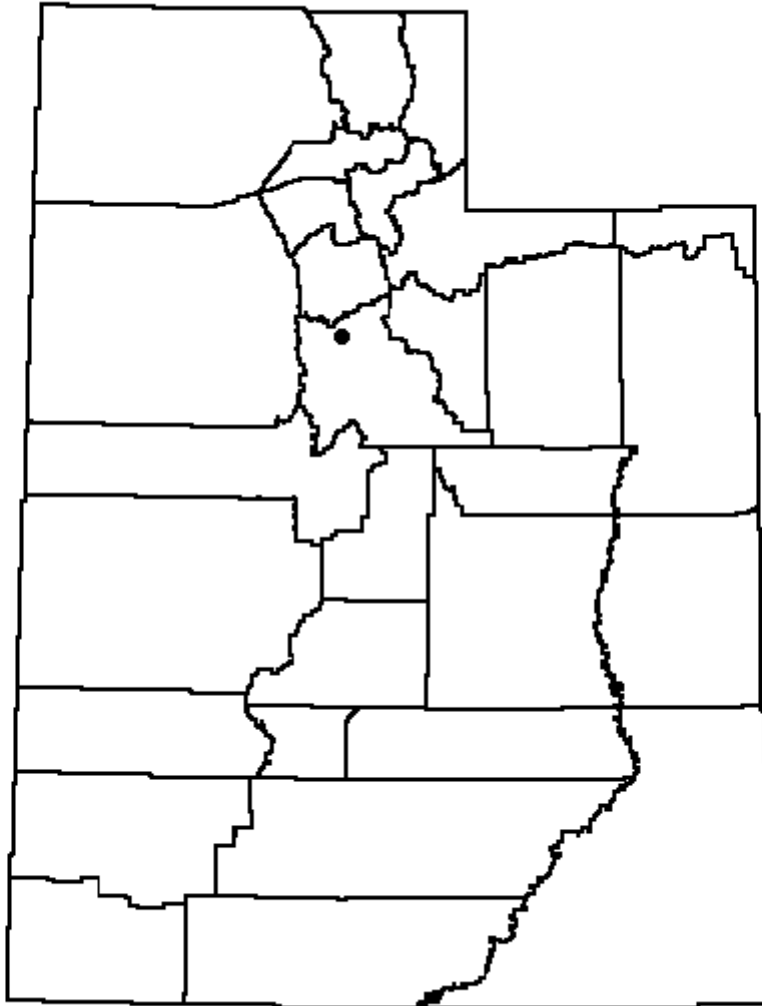


Figure 24. The Utah locality for the desert valvata (*Valvata utahensis*) obtained from literature.

***Fossaria parva* (I. Lea, 1841)**
pygmy fossaria

Utah Taxonomy

Henderson and Daniels (1916) reported this species in Utah under the name *Lymnaea parva*.

No subspecies are recognized in this species.

Status in Utah

Four occurrences are known in Utah; however, all of these are historical. Of these 4 localities, 3 are in north-central Utah: extreme eastern Box Elder County (Henderson and Daniels 1916), Davis County (Jones 1940a), and Salt Lake County (Jones 1940a). The fourth Utah locality is in the extreme east-central part of the state: extreme southern Grand County (Chamberlin and Berry 1929).

Although good abundance data are lacking for this species in Utah, it seemingly is (or was) rare. The numbers of specimens collected at the 4 Utah localities were 80 (Henderson and Daniels 1916, all very likely having been dead), 1 (Chamberlin and Berry 1929, Chamberlin and Jones 1929), and 3 and 14 (Jones 1940a). It is quite possible that no living individuals of this species have ever been found in Utah.

Threats to this species in Utah have not been reported. Like many native aquatic mollusks in Utah, threats probably are great and likely include dewatering (e.g., draining, diversion), alteration, and degradation (e.g., pollution) of aquatic habitats. Three of the 4 historical occurrences are in the most heavily developed part of the state, an area where most of the wetlands have been drained or extremely altered and where most of the land has been taken up by agriculture and by urbanization; thus, it is doubtful whether any of these 3 occurrences remain. One historical occurrence ("Union, [Salt Lake County,] Utah") is now part of the Salt Lake City urban area and is almost certainly extirpated. Population trend of this species in Utah is not known.

Inventory is needed to determine whether this species is extant in Utah, whether any of the historical populations still exist, and the extent of distribution and abundance, if the species is extant.

Habitats Utilized in Utah

No useful habitat data have been reported for this species in Utah. Henderson and Daniels (1916) reported: "In the dried-up backwater from the canal ... we found 80 *Lymnaea parva* Lea" The implication is that the specimens were empty shells, perhaps washed to the location where they were found.

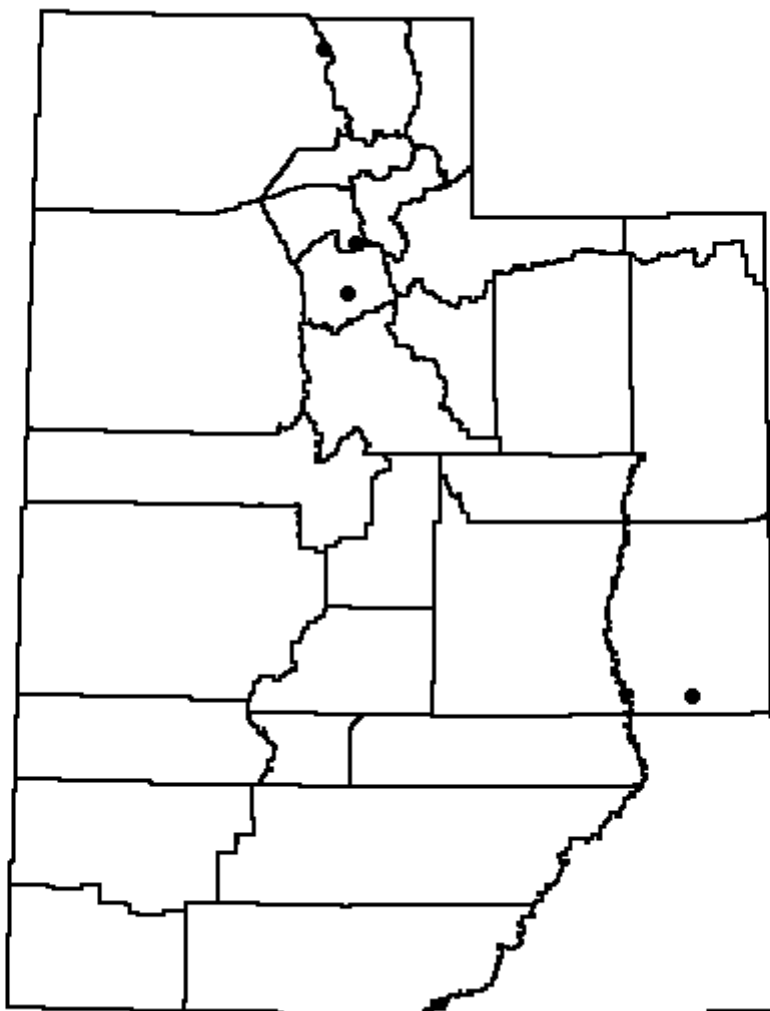


Figure 25. Utah localities for the pygmy fossaria (*Fossaria parva*) obtained from literature.

***Fossaria rustica* (l. Lea, 1841)**
a fossaria (no common name)

Utah Taxonomy

Several authors (e.g., Chamberlin and Jones 1929, Jones 1940b, Woolstenhulme 1942a, and Chamberlin and Roscoe 1948) discussing this taxon in Utah have treated it as a race of *Fossaria modicella*: "*Fossaria modicella rustica*". Turgeon et al. (1988, 1998) listed this taxon as a full species but seemingly with reservations, for they consider its classification to be uncertain.

No subspecies are recognized in this species.

Status in Utah

There are 12 known occurrences of this species in Utah, all being historical. It has been reported in Utah mainly from the north-central part of the state, where it is known from extreme western Summit County (Jones 1935), extreme southern Morgan County (Jones 1935), extreme northeastern Tooele County (Jones 1940b, Woolstenhulme 1942a), and northern Utah County (Jones 1940a). It has also been reported from northeastern Utah in Uintah County (Woolstenhulme 1942a). There is one record from extreme southern Utah in Kane County (Daniels and Ferriss in Chamberlin and Jones 1929).

No meaningful abundance data have been reported for this species in Utah. Jones (1940b) did mention "three living specimens", which indicates that the species has been found alive in this state. Jones (1940a) reported "two", and Woolstenhulme (1942a) listed "4" and "4" from two localities, but there was no indication by either author whether any of these were living.

Threats to this species in Utah have not been reported. Since almost any aquatic site in Utah may be subject to dewatering, alteration, and degradation, and since most of the known localities for this species in Utah are in areas that have experienced and currently are experiencing serious impacts from development, threats to this species in Utah, if it is extant here, are likely great. Population trend of this species in Utah is not known.

Inventory is needed to ascertain whether this species is extant in Utah and, if so, to determine its distribution and abundance.

Habitats Utilized in Utah

No habitat data have been reported for this species in Utah. The known Utah localities range greatly in elevation.

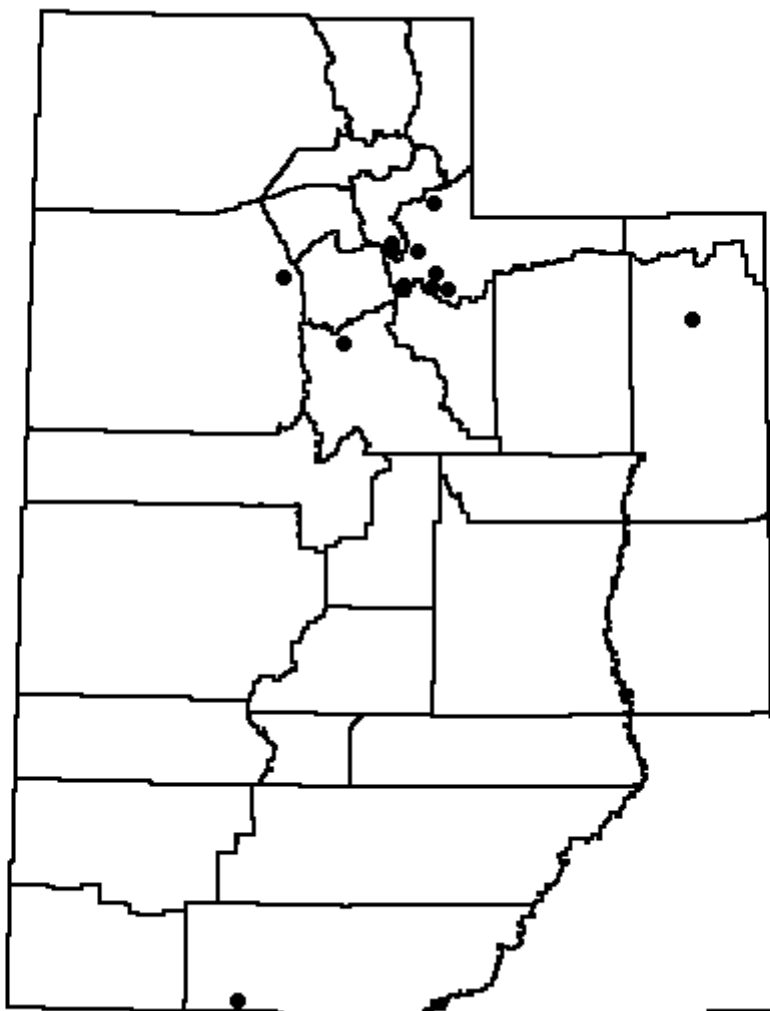


Figure 26. Utah localities for a fossaria (no common name) (*Fossaria rustica*) obtained from literature.

***Fossaria bulimoides* (I. Lea, 1841)**
prairie fossaria

Utah Taxonomy

Gregg (1940), reporting this species in Utah, placed it in the genus *Lymnaea* and the subgenus *Stagnicola*: "*Lymnaea (Stagnicola) bulimoides*". A year later the same author (Gregg 1941b) recorded it at a second Utah locality, this time placing it in the genus *Stagnicola* as "*Stagnicola bulimoides*". Chamberlin and Roscoe (1948) followed this latter arrangement, "*Stagnicola bulimoides*". (It should be noted that both Gregg [1940, 1941b] and Chamberlin and Roscoe [1948] considered what is now known as *Fossaria techella*, which is of uncertain taxonomic status, to be a race of the species now known as *Fossaria bulimoides*.)

Although Gregg (1940, 1941b) reported "*Lymnaea (Stagnicola) bulimoides cassi*" and "*Stagnicola bulimoides cassi*" in Utah, the race *cassi* apparently is no longer considered to be valid (see Burch 1989). Chamberlin and Roscoe (1948) listed both "*Stagnicola bulimoides bulimoides*" and "*Stagnicola bulimoides cassi*" as occurring in Utah. It is believed that this species is represented in Utah by the type race *Fossaria bulimoides bulimoides*.

Status in Utah

In Utah this species has been reported from only 2 localities, not far from each other, in southwestern Utah (extreme eastern Washington and extreme southeastern Iron counties).

No information regarding abundance of this species in Utah has been reported; however, in view of the fact that the species was not found by many early malacological workers in Utah (see, for example, Chamberlin and Jones 1929, who summarized knowledge of the mollusks of Utah up to that time), the species may be considered rare in this state. It is possible that more collections of this species in Utah have been made than have been reported in the literature (cf. nomenclature in Gregg 1940 and 1941b with that in Chamberlin and Roscoe 1948).

Although threats to this species in Utah are not known, because of the manifold threats to nearly all aquatic ecosystems in the state, this aquatic species should be considered at least moderately threatened. Population trend in this species in Utah is unknown.

Inventory is needed to determine the extent of distribution and the abundance of this species in Utah, not only in the areas where it has been reported in the state but also in other regions.

Habitats Utilized in Utah

Gregg (1940) reported this species in Utah from a "small stream". Gregg (1941b) listed this species from a second Utah locality that he characterized as follows: "[T]he altitude was 10,000 feet. There was a moderate amount of moisture most of the time and but a few yards away a series of springs in a swampy meadow formed brooklets" He reported both terrestrial and aquatic mollusks from this locality; since this species is aquatic, it presumably occupied the springs, swampy meadow, or "brooklets" mentioned in Gregg's account.

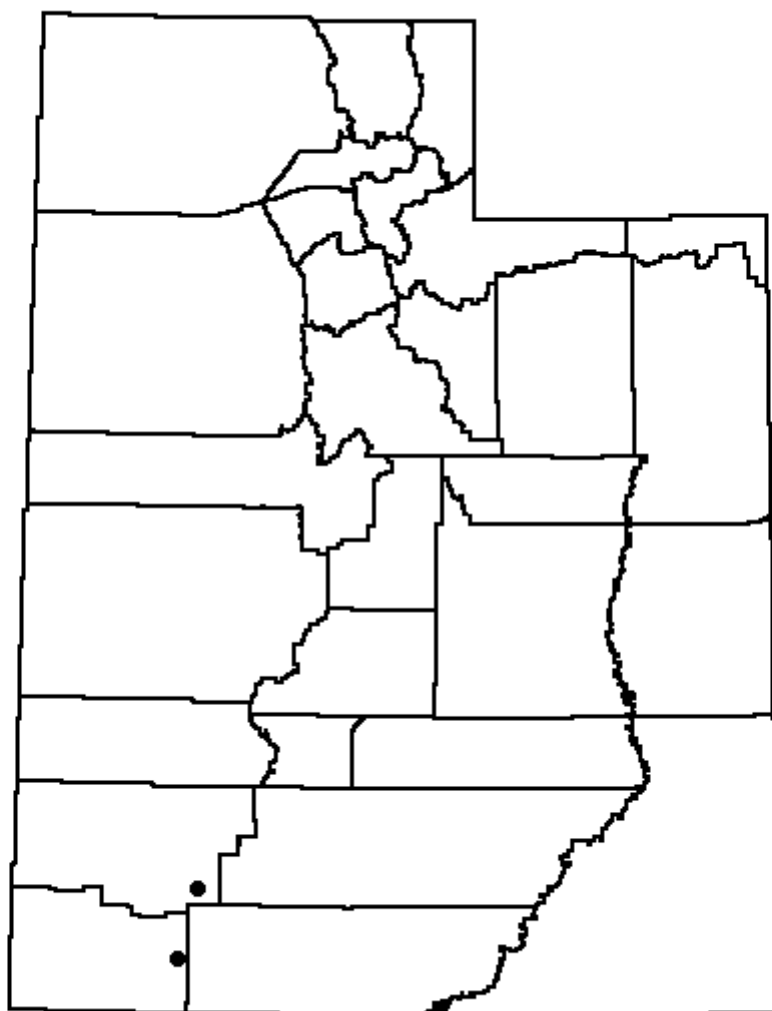


Figure 27. Utah localities for the prairie fossaria (*Fossaria bulimoides*) obtained from literature.

***Fossaria techella* Haldeman, 1867**
a fossaria (no common name)

Utah Taxonomy

All authors who have commented on this taxon in Utah (e.g., Brooks 1936; Gregg 1941b, 1942; Chamberlin and Roscoe 1948) have used the name "*Stagnicola bulimoides techella*" for it.

Clarke (1973) regarded this organism as merely a morph of *Fossaria bulimoides* and not as a valid taxon. Turgeon et al. (1988, 1998), though they have listed it tentatively as a full species, have considered its taxonomic status uncertain.

No subspecies are recognized within this nominal species.

Status in Utah

Three occurrences of this species in Utah have been reported, these being from Duchesne County in northeastern Utah (Brooks 1936) and from Iron and Garfield counties in the southwestern part of the state (Gregg 1941b, 1942). Whether it is more widespread in the state, perhaps occurring in the area between these known localities, is not known.

No information concerning abundance of this species in Utah has been reported. The paucity of Utah records and localities suggests that it is rare in the state.

Although threats to this species in Utah are not known, because it is aquatic and aquatic ecosystems in this state are themselves generally threatened by a variety of anthropogenic impacts, it should be regarded as at least potentially threatened. Population trend of this species in Utah is unknown.

Inventory is needed to determine the distribution and abundance of this species in Utah. The area in central Utah between known localities should particularly be searched.

Habitats Utilized in Utah

Brooks (1936) reported this gastropod in Utah from a "[p]ond ... altitude 10,000 feet." Gregg (1941b) recorded it at a Utah locality also at 10,000 ft and at which he mentioned "a series of springs in a swampy meadow [that] formed brooklets",

his specimen(s) presumably having been taken from the springs, the swampy meadow, or the "brooklets". Gregg (1942) again reported this taxon in Utah, this time in a stream at 8,000 ft.

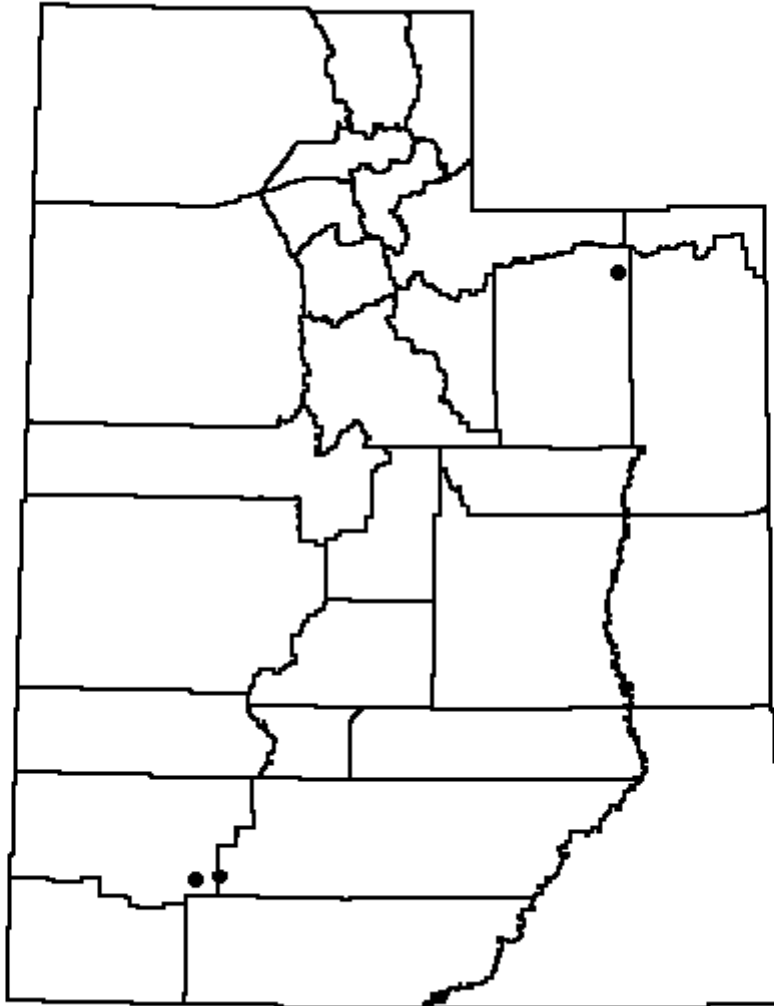


Figure 28. Utah localities for a fossaria (no common name) (*Fossaria techella*) obtained from literature.

***Lymnaea stagnalis* Linnaeus, 1758**

swamp lymnaea

Utah Taxonomy

Almost all references to this species in Utah have used the currently accepted name *Lymnaea stagnalis*. Ingersoll (1876) mentioned its presence in Utah and employed the spelling in common use at the time: "*Limnea stagnalis*". Chamberlin and Jones (1929) and Chamberlin and Roscoe (1948) listed in Utah not only *Lymnaea stagnalis* but also *Lymnaea lepida*, the latter name having since then been placed in synonymy with *Lymnaea stagnalis*.

The race of this species that occurs in Utah is *Lymnaea stagnalis appressa*.

Status in Utah

About 11 occurrences that seem to represent fresh material have been reported in Utah. Although Baker (1911, Fig. 9) mapped this species as occurring throughout most or all of Utah, localities believed to have been based on living or fresh (i.e., not subfossil or fossil) material have been reported mainly in north-central Utah (Rich, Cache, Davis, Salt Lake, Tooele, and Utah counties) as well as in southwestern Utah (Garfield County) (see Chamberlin and Jones 1929, who summarized much of the literature concerning this species in Utah).

Abundance of this species in Utah is not well understood. Apparently it was once well known, and possibly common, in Utah Lake, where it seemingly no longer occurs. Jones (1940a) listed 5 specimens from one locality.

While threats to this species in Utah are not known, its apparent disappearance from Utah Lake and perhaps other sites suggests its precarious position in Utah. Certainly there are multiple, serious threats to its habitats, especially in the area where most historically reported localities of this species in Utah are situated: along the Wasatch Front. These threats include the draining of wetlands, dewatering and diversions for agricultural irrigation, development (agricultural, industrial, and residential), and degradation of wetlands through many kinds of pollution including agricultural runoff, industrial effluents, sewage, and mosquito abatement activities.

This species formerly was well known from Utah Lake but is believed no longer to survive there, and it is questionable whether it is extant at certain other historical

Utah localities. Thus it is considered to have declined and likely still to be declining in abundance and distribution in this state.

Inventory is needed to ascertain the current status (distribution and abundance) of this species in Utah and should begin with surveys for it at the known historical localities.

Care should be taken to distinguish reports of this species based on prehistoric material (fossils or subfossils) from those based on fresh or living examples that represent historical or extant populations.

Habitats Utilized in Utah

Records of this species in Utah summarized by Chamberlin and Jones (1929) refer to lakes, springs, ditches, and "swamps" (presumably meaning marshes). In their (Chamberlin and Jones 1929) discussion of a Utah race (*Lymnaea stagnalis wasatchensis*) of this species that is no longer considered to be valid, they wrote: "Examples of this form were found conjugating on rushes just below the water line in an old swamp"

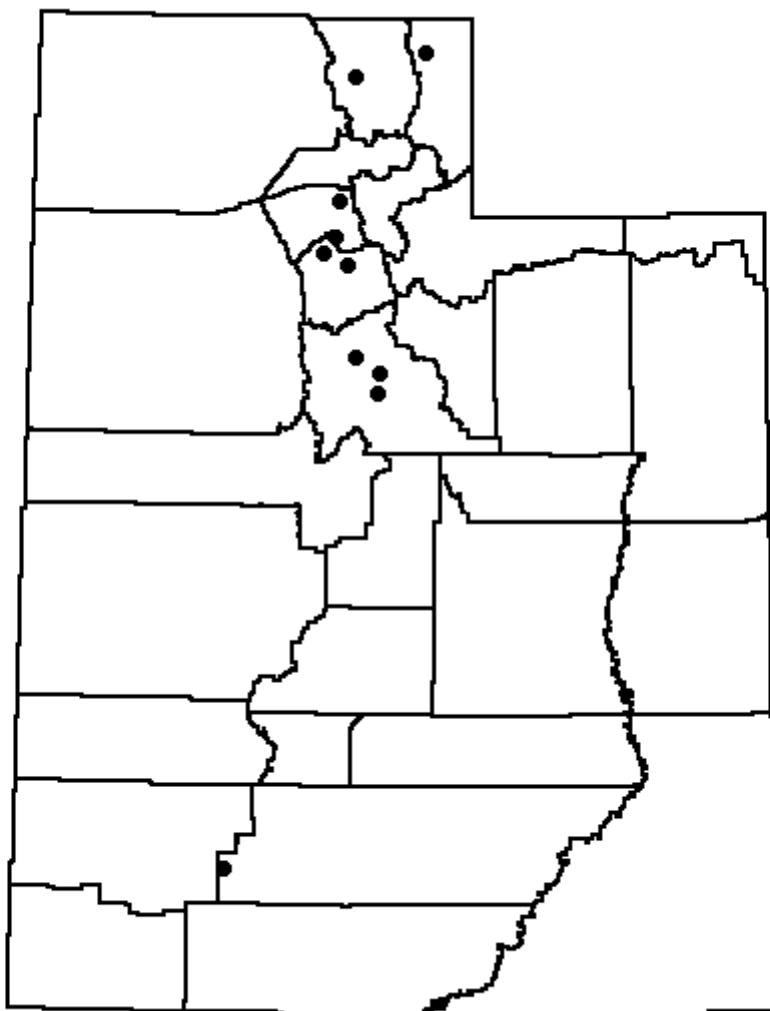


Figure 29. Utah localities for the swamp lymnaea (*Lymnaea stagnalis*) obtained from literature.

***Stagnicola traski* (Tryon, 1863)** **widelip pondsnail**

Utah Taxonomy

Henderson and Daniels (1917), in the only report of this species from Utah, used for it the name *Lymnaea traskii*. Chamberlin and Jones (1929), summarizing Henderson and Daniels' (1917) Utah findings, called the species *Stagnicola traskii*. Chamberlin and Roscoe (1948) listed it for this state as *Stagnicola traski*, the name currently applied to the species.

No subspecies are recognized in this species.

Status in Utah

Baker (1911) summarized all known localities for this species, these being about 4 localities in California and 1 each in Wyoming and Alberta, and commented: "A careful search [for this species] will doubtless fill the vacant territory between Wyoming, California and Alberta." Two somewhat questionable historical occurrences of this species in Utah have been reported. Henderson and Daniels (1917), the only authors who have reported finding this species in Utah, provided the two locality records for this state, both in north-central Utah: below the mouth of Ogden Canyon (Weber County) and the west side of Garfield (Tooele County). There remains, however, some doubt whether this species actually occurs or ever occurred in Utah. Chamberlin and Jones (1929) wrote: "The occurrence of typical *traskii* in Utah is doubtful. ... Henderson now refers specimens ... listed on authority of himself and Daniels to *nuttalliana*." Despite this statement, almost 20 years later Chamberlin and Roscoe (1948) continued to list *Stagnicola traski* as occurring in Utah and did not list *Stagnicola nuttalliana*. (*Stagnicola nuttalliana*, incidentally, is no longer a recognized species.) Thus it appears that Chamberlin reversed his earlier opinion and accepted Henderson and Daniels' (1917) Utah records of *Stagnicola traski* after all.

No information regarding abundance of this species in Utah has been reported. If the species does indeed occur in this state, it is presumed to be rare; threats to it are not known but would likely be great. Certainly one of the reported Utah localities, the mouth of Ogden Canyon, is in an area that has been and continues to be developed. Loss, alteration, and degradation of aquatic ecosystems in north-central Utah would likely impact any Utah populations of the species. No information regarding population trend of this species in Utah has been reported.

Inventory is needed at the two historical localities of this species' occurrence in Utah as well as elsewhere in north-central Utah. Any inventory work done should emphasize careful identification and determination that any specimens located are truly *Stagnicola traski*. If it can be found in Utah, an attempt should be made to ascertain its current status (distribution and abundance) in the state.

Habitats Utilized in Utah

Henderson and Daniels (1917) reported this species in Utah from "a small, sluggish stream" and from "sloughs".

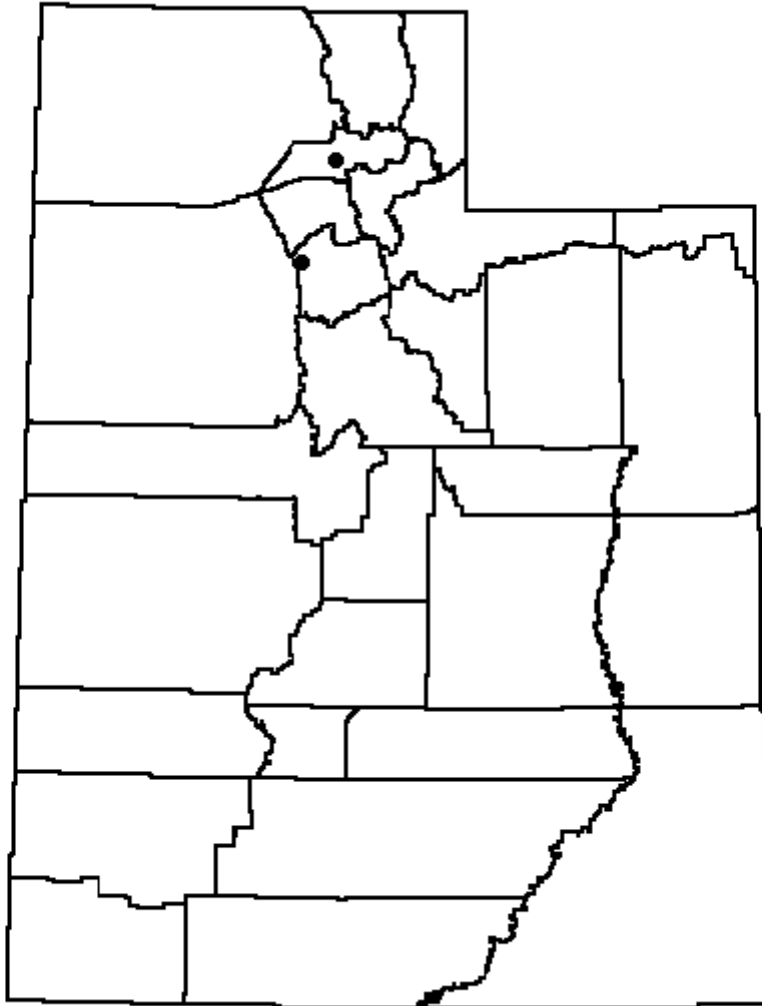


Figure 30. Utah localities for the widelip pondsnail (*Stagnicola traski*) obtained from literature.

***Stagnicola bonnevillensis* (Call, 1884)**
fat-whorled pondsnail

Utah Taxonomy

Chamberlin and Jones (1929), who knew this species only as a fossil form, used for it the common name the Bonneville snail. Clarke (1991) called it the banded Bonneville stagnicola.

No subspecies are recognized in this species.

Status in Utah

This species is known to be extant at only 3 very closely associated sites (Clarke 1991). Clarke (1991) wrote: "A relict species, previously correctly reported only from Pleistocene Lake Bonneville deposits and until recently thought to be extinct"

The three sites inhabited by this species are "located in an area about 3 miles long close to Utah Highway 83, between mileposts 14 and 17 (measured from Corinne, Box Elder Co.)" (Clarke 1991), in northeastern Box Elder County, Utah.

Clarke (1991) estimated a combined total population of more than 3 million individuals; however, Clarke appears to be inclined to liberal estimation of gastropod populations (see, for example, account of *Oreohelix eurekaensis* for discussion of another of Clarke's population estimates). Even if Clarke's estimate is not exaggerated, since the species survives at only 3 sites, its overall population must still be considered small relative to other similar organisms.

While actual threats are not known, potential threats include "dewatering, pollution, [and] the introduction of fishes" (Clarke 1991).

Continued searches for other populations in northwestern Utah may be of value.

Habitats Utilized in Utah

Clarke (1991) wrote: "The pools which contain *S. bonnevillensis* are all spring-fed, occupy areas of between 1/4 and 1 acre, have diverse substrates (mud, gravel, and/or rocks) and are well-vegetated. When first searched in 1990 (on June 15) water quality measurements were: pH, 7.2–8.2; temperature, 16–18 EC;

conductivity, 4,500–10,000 micromhos [/cm]; and oxygen values varied from low (2.8 ppm in the mouth of the underwater spring at [one station]) to supersaturated (14.8 among algae at [another station]), but were intermediate elsewhere. The whole region has extensive lacustrine deposits. At [one station] *S. bonnevillensis* also occurred in a narrow outlet ditch."

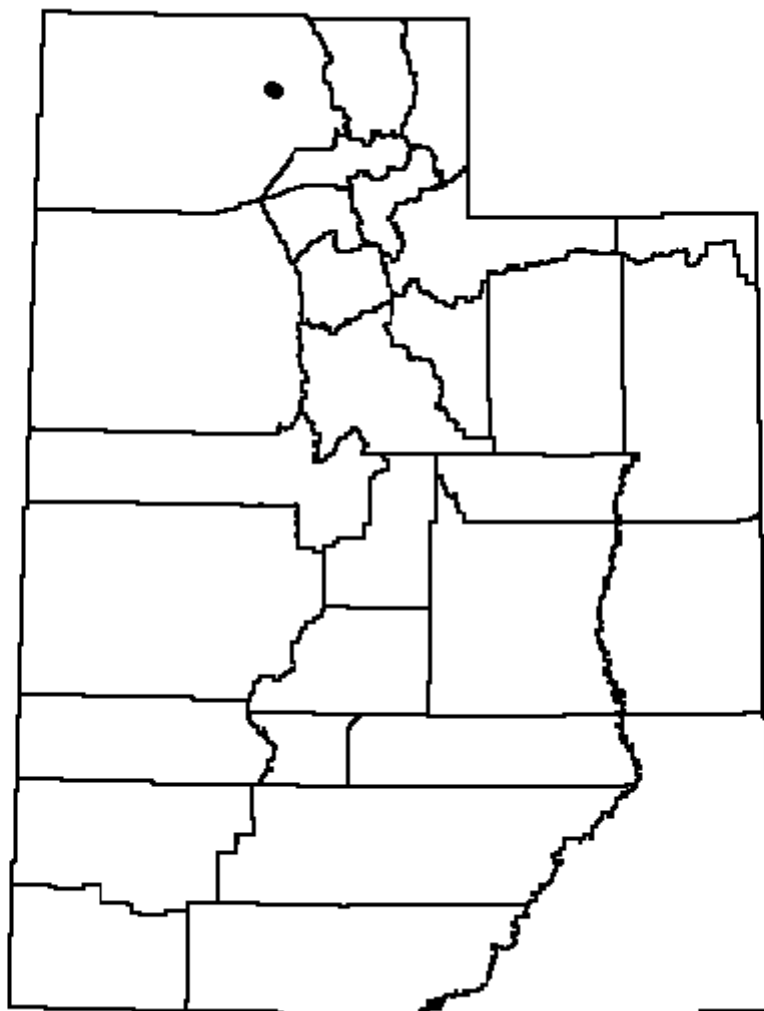


Figure 31. Utah localities for the fat-whorled pondsnail (*Stagnicola bonnevillensis*) obtained from literature.

***Stagnicola utahensis* (Call, 1884)** **thickshell pondsnail**

Utah Taxonomy

Call (1884) named and described this taxon as *Radix ampla* var. *utahensis*, its type locality being "Utah Lake, near Lehi, Utah", and in the type description noted "its relation to *Polyrhytis kingii*". The type specimens, according to Baker (1911), are in the "Smithsonian Institution, four specimens, No. 31276.

Baker (1911) used the name *Galba utahensis* for this species, and placed it in the subgenus *Polyrhytis*, noting: "*Polyrhytis* is placed tentatively near *Stagnicola*. The genitalia and radula of *utahensis* are unknown and until these are published the group cannot be definitely placed." Chamberlin and Jones (1929) discussed this species under the name *Polyrhytis utahensis*, elevating *Polyrhytis* to generic status with the caveat: "The exact relationship of this genus cannot be known until the anatomy of *utahensis*, the only recent and living representative, is worked out." Lowrance (1934) assigned it to the fossil species *Stagnicola kingi*, and Jones (1940a) and Woolstenhulme (1942a) also used this name for the species. Chamberlin and Roscoe (1948) called the species *Stagnicola kingii*. Clarke (1991) and other modern authors have assigned the species to *Stagnicola utahensis*.

Chamberlin and Jones (1929) coined the common name Utah ribbed snail for the species. Clarke (1991) called it the costate Bonneville stagnicola.

Clarke (1991) has questioned whether this taxon is actually specifically distinct from *Stagnicola bonnevillensis*; however, he stopped short of declaring the two to be synonyms and expressed his view in an unreviewed, unpublished report, and no other malacological authority or author has followed him even in questioning the validity of the two as separate species.

No subspecies have been proposed in this species.

Status in Utah

This species is known, based on living examples, only from Utah Lake, Utah County, and, reportedly, from "Conner's Spring" (= Connor Springs?), Box Elder County (Woolstenhulme 1942a), although the identification of specimens from the latter locality has been questioned (see Clarke 1991). Lowrance (1934) wrote of this species (as *Stagnicola kingi*): " ... [I]n Utah Lake ... they now live apparently

only on the west side along a quarter mile length of shore" The species has not been reported as living by any authors since Lowrance (1934).

In the type description Call (1884) remarked: "This is a rare form in Utah Lake, its only locality so far as known." The species survived there until the early 1930s, when Lowrance (1934) remarked: "[I]t is now all but extinct." Recent surveys (e.g., Clarke 1991) have failed to detect living examples.

The cause(s) for the decline and presumed extinction of this species apparently have not been discussed in the literature concerning this species. Since the last living individuals of the species reportedly were found at Utah Lake in the early 1930s (Lowrance 1934), which is approximately the time that certain fishes endemic to Utah Lake are believed to have become extinct, it is plausible that the causes of these extinctions may have been the same. In the case of the fishes, it is believed that the extinctions were the result of extended drought in the early 1930s that drastically lowered water levels in Utah Lake, which even at its fullest is very shallow (only a few feet deep), combined with harsh winters that caused the reduced water in the lake to freeze to (or near) the bottom, probably killing all but the hardiest of organisms living there. Low water levels at this time probably also greatly increased the alkalinity of the lake; that increased alkalinity may have contributed to the demise of this species is suggested by the observation of Lowrance (1934), the last author to report finding this species alive, who noted that he found it only "where springs arising near the present lake level keep the water fresher than it is elsewhere."

Since many examples are known of species presumed to be extinct but later found to be extant, there may be value in continuing to search for living populations of this species in north-central or even northwestern Utah.

Habitats Utilized in Utah

Seemingly the habitat of this species has never been reported. It formerly occurred in Utah Lake and possibly in springs along its shores (see Lowrance 1934). (It was also reported from an isolated spring in northeastern Box Elder County, but the identification of specimens from this locality has been questioned, as discussed above.)

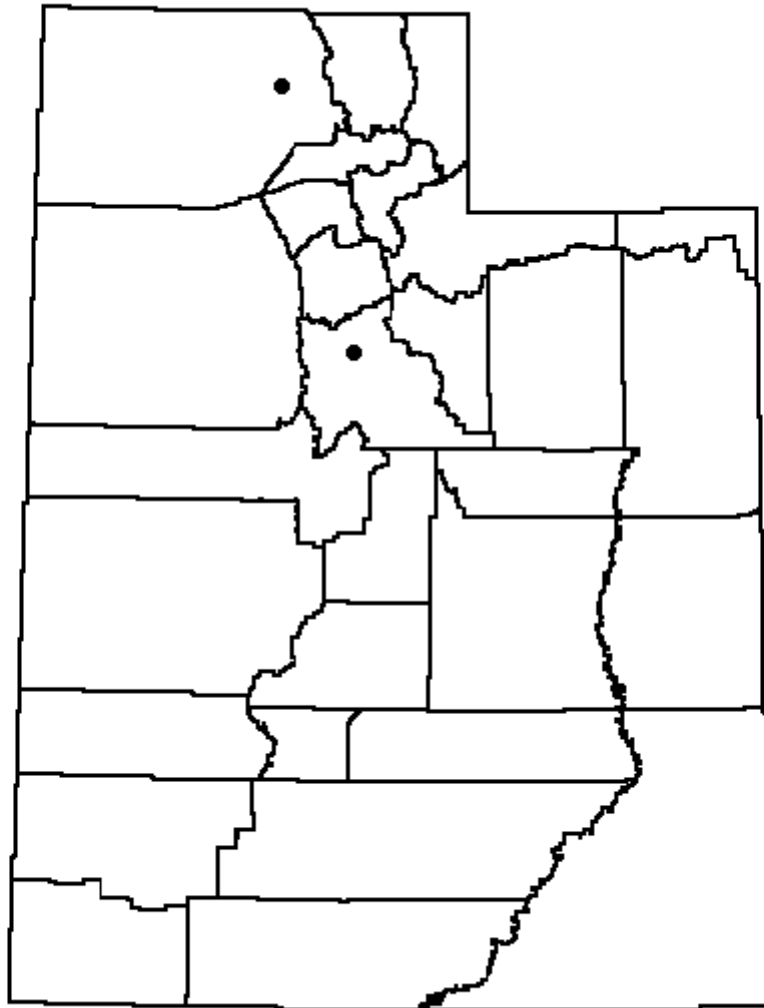


Figure 32. Utah localities for the thickshell pondsnail (*Stagnicola utahensis*) obtained from literature.

***Stagnicola montanensis* (F. C. Baker, 1913)**
mountain marshsnail

Utah Taxonomy

No subspecies have been proposed in this species.

Status in Utah

Nine localities for this species in Utah are known (see Taylor et al. 1963); these represent 6 occurrences. These are from Cache and Summit counties in the extreme north-central part of the state and from Beaver County in south-central Utah.

The species potentially occurs throughout the Great Basin and Columbia Basin portions of the state—that is, roughly the northwestern one-third of Utah—and possibly the High Plateaus of central Utah and even the western parts of the Wasatch and Uinta mountains. However, the known localities in Utah suggest that the species may not actually occur *within* the Great Basin portion of the state but rather around the margins of the Great Basin, i.e., the shores of Pleistocene Lake Bonneville, which is a distributional pattern known for certain other animal species. Moreover, the restriction of this species to "the outflow of springs, or in clear mountain streams" (Taylor et al. 1963) suggests that few sites within the Great Basin in Utah would be suitable for it while many situations around the edges of the Great Basin would be ideal.

Taylor et al. (1963) reported 108 specimens of this species from Utah. "Most [of these] specimens were collected alive, but a few were recently dead" (Taylor et al. 1963).

Although actual threats to this species in Utah are not known, potential threats are great. Since "[i]t is a pure-water snail" (Taylor et al. 1963), any degradation of water quality where it occurs, such as erosional runoff from road or other construction producing turbidity or siltation, would be a threat since "it is never found in ... muddy water bodies" (Taylor et al. 1963). Impoundments and other alterations of flow such as channelization would also be serious threats since "it is never in large clear waters such as lakes or rivers" (Taylor et al. 1963). The population trend of this species in Utah is not known.

Inventory in proper habitat along the eastern edge of the Great Basin, especially

between Summit and Beaver counties is needed. The species should also be looked for in northwestern Box Elder County.

This species is extremely difficult to distinguish from some related species, especially *Stagnicola caperatus*, with which it is sympatric in Utah.

Habitats Utilized in Utah

Taylor et al. (1963) mentioned habitat information for 8 of the 9 Utah localities that they reported: "muddy ditch across a swampy pasture by the road", "spring ... tributary to Beaver Creek", "small stream", "half-dry spots by a ditch", "swampy pasture", "[s]wampy pasture along a ditch", "swampy pasture", "creek". Regarding the species throughout its range, these same authors stated: "*S. montanensis* is unique [within the family Lymnaeidae] in combining a pure-water habitat with a small or even seasonal water body." See Taylor et al. (1963, pp 267–271) for further discussion of the habitat specificity of this species.

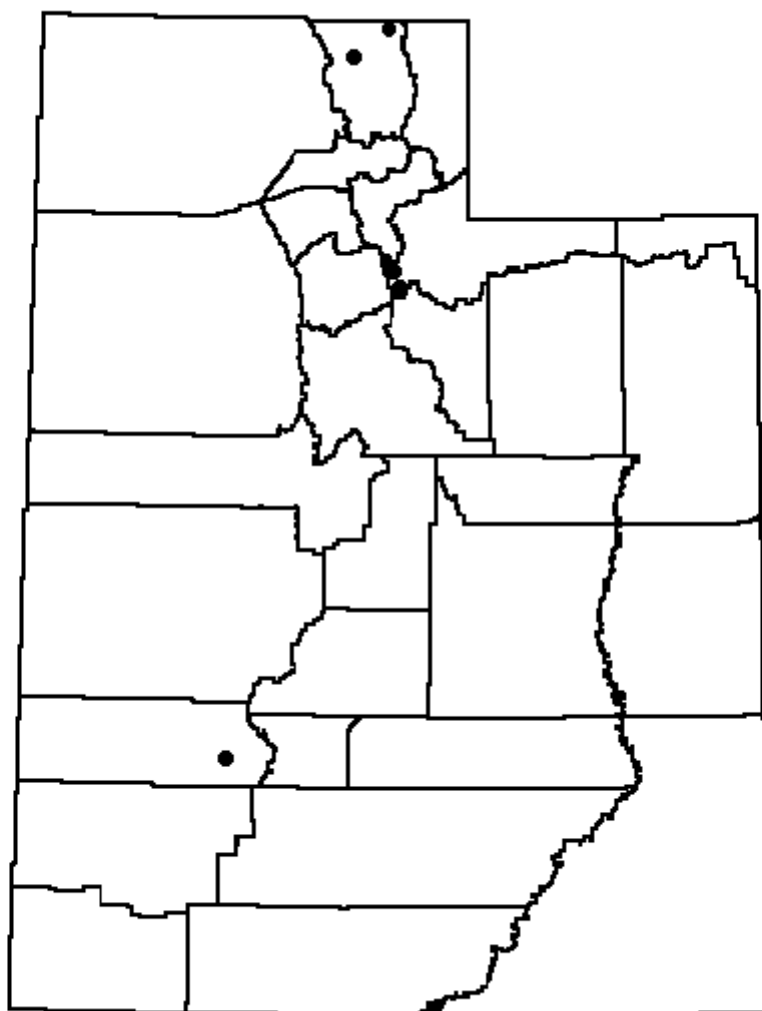


Figure 33. Utah localities for the mountain marshsnail (*Stagnicola montanensis*) obtained from literature.

***Stagnicola pilsbryi* (Hemphill, 1890)**

Fish Springs marshsnail

Utah Taxonomy

Hemphill (1890), who named and described this species, placed it in the genus "*Limnaea*" (= *Lymnaea*). Baker (1911) assigned the species to the genus *Galba*. Most modern authors (e.g., Taylor et al. 1963, Russell 1971) have arranged it as a species of *Stagnicola*. Taylor et al. (1963) demonstrated that, within *Stagnicola*, the species belongs to the subgenus *Hinkleyia*. Clarke (1991) argued that the species should be assigned to the genus *Bakerilymnaea*; he called this species the Fish Springs lymnaeid.

No subspecies have been proposed in this species (i.e., the species is monotypic).

Status in Utah

There is one historical occurrence of this species, now considered to be extinct. Hemphill (1890) stated the type locality as "Fish Spring, Nevada". Baker (1911) expanded Hemphill's locality to "TYPE LOCALITY: Fish Spring, Nye County, Nevada" and "NEVADA : Fish Springs, Nye Co., in approximately lat. 38.45, long. 116.30 ...". Taylor et al. (1963) commented: "Hemphill's label with the type says 'Fish Spring Nevada between Austin and Salt Lake', thus ruling out the locality specified by Baker. Most probably Hemphill collected at Fish Springs, northern Juab County, Utah" The opinion that Fish Springs, Juab County, Utah, is the locality where Hemphill collected the first specimens of this species has been followed by others (e.g., Russell 1971, Clarke 1991); it is also the only locality from which others since Hemphill have collected specimens of the species, all of these specimens being dead, empty shells.

This species is believed no longer to be extant. Taylor et al. (1963) wrote: "Only three specimens of this species are known, all from the original lot collected by Henry Hemphill in 1868. ... The bleached periostracum and the dirt inside the aperture shows that all three were collected as empty shells. Hemphill's label notes 'These are the best I can do for you. I have but two or three others ...'. These additional specimens have not been traced." Russell (1971) reported: "In all, 134 complete shells and 30 fragmented specimens of this species were collected [in 1970] on the surface of the ground" Apparently Russell found no living representatives of this species, which Clarke (1991) believed was already extinct when Russell surveyed the molluscan fauna of Fish Springs.

If some remnant of a population has survived undetected at Fish Springs National Wildlife Refuge, current management practices at the refuge would include very serious threats to the species. Clarke (1991) wrote: "Overmanagement for the purpose of enhancing duck habitat appears to have caused the extinction of this species." Russell (1971) noted that the only place where he found remains of this species at Fish Springs "had recently been drained and burned over", and Clarke (1991) believed that "annual burning of the area to increase duck nesting habitat and the fostering of dense duck populations may well have been important factors which contributed to this extinction." Thus, the threat that ultimately led to the extinction of this species is thought to have been the alteration of the marsh habitat of the species.

Careful inventory of Fish Springs National Wildlife Refuge in a further attempt to rediscover a living population of this species is needed, and searches of any potentially suitable nearby sites that may have escaped the management that led to the extirpation of the species at Fish Springs N. W. R. would be worthwhile.

Clarke (1991) commented: "... we should learn from this situation [i.e., the extinction of a molluscan species that occurred only within a national wildlife refuge] that habitat manipulation for enhancement of game species, in nearly all instances, is probably incompatible with the preservation of other species."

Habitats Utilized in Utah

Taylor et al. (1963) wrote: "Nothing is known of the habitat of *Stagnicola pilsbryi*. From the fact that it is a narrowly localized species, whereas its close relatives are widespread, one might infer it has some ecological specialization." Russell (1971), although he apparently did not find living examples of this species, which probably was already extinct by the time he visited Fish Springs in 1970, evidently believed that the species was extant and speculated: "From the location in which the shells were found, it appears that *S. pilsbryi* lives in a shallow, semipermanent marsh. Although burned over, this area was covered with the remains of emergent marsh grasses." Clarke (1991) wrote: "This species occurred in an isolated group of springs, in a scrub desert environment"

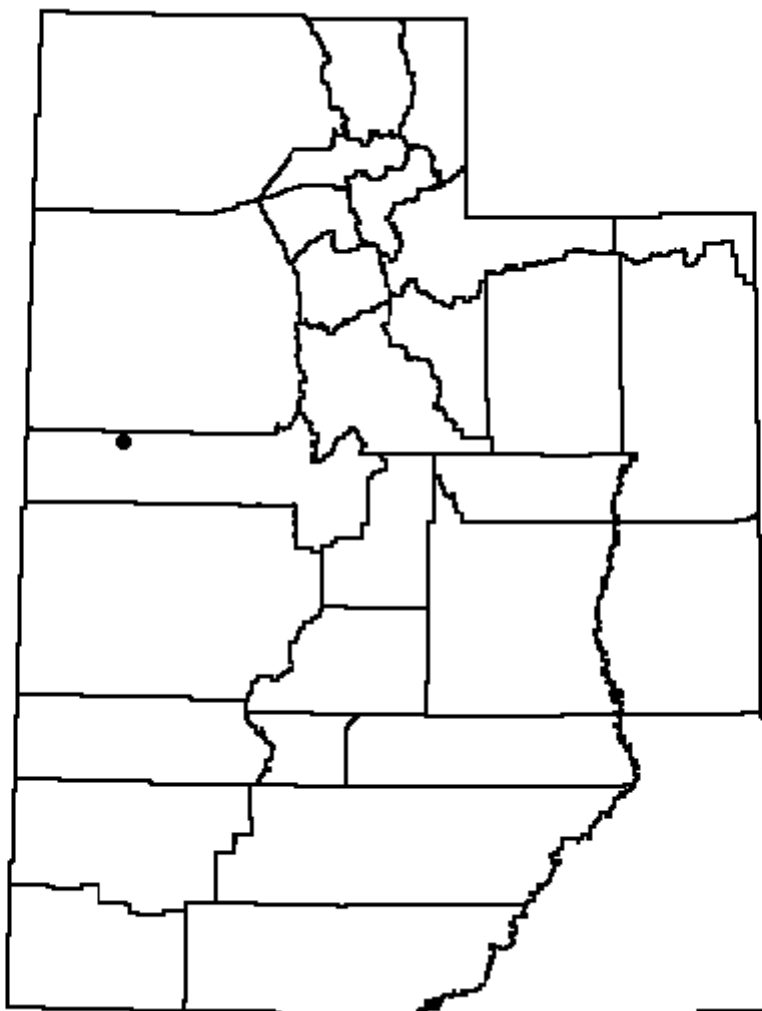


Figure 34. The Utah locality for the Fish Springs marshsnail (*Stagnicola pilsbryi*) obtained from literature.

***Physa skinneri* Taylor, 1954**
glass physa

Utah Taxonomy

Taylor (1988) noted in his synonymy for this species that three collections reported from Utah by Chamberlin and Jones (1929) as "*Aplexa hypnorum*" (= *Aplexa elongata*) were actually misidentifications of this species.

No subspecies have been proposed in this species..

Status in Utah

Seven historical occurrences of this species in Utah have been reported. These are mainly from the north-central part of the state (Rich, Davis, Salt Lake, and extreme western Summit counties), but the species is also known from 2 localities in the south-central part of the state (both in Sevier County) (Taylor 1960, 1988).

Taylor (1960) mentioned a collection of 10 specimens from one locality in Utah, which is the only information pertaining to the abundance of this species in this state except for an earlier report of "one large and a few small specimens" originally misidentified (see Taylor 1988) as another species (Chamberlin and Jones 1929 as *Aplexa hypnorum*).

Threats to this species in Utah are not known. However, many of the reported Utah localities for it are in northern Utah along the Wasatch Front, an area experiencing rapid and intense urban, agricultural, and industrial development and where aquatic ecosystems are themselves threatened by destruction, degradation, and alteration. Threats to this species are likely great, and the species should be regarded highly vulnerable in this state. Population trend of this species in Utah is not known.

Inventory is needed both at sites where it has been found historically and elsewhere, especially in areas between Salt Lake and Sevier counties.

Habitats Utilized in Utah

Taylor (1960), who reported 2 collections of living (as opposed to fossil) material representing this species, one of these collections being from Utah and the other from "1 mile above the Utah border" in Wyoming, wrote: "The scanty information

from the Recent occurrences suggests this species lives in shallow bodies of water, either perennial or seasonal, such as temporary ponds, sloughs, and backwaters along streams." The Utah locality mentioned by Taylor (1960) was a creek at 6,000 ft elevation. Taylor (1988) reported other Utah localities including a "[t]emporary pond", a "*Typha* swale" along a highway, and a lake. Chamberlin and Jones (1929) reported this species, misidentified (*fide* Taylor 1988) as "*Aplexa hypnorum*" (= *Aplexa elongata*), from a pond and from a "slough near airplane field".

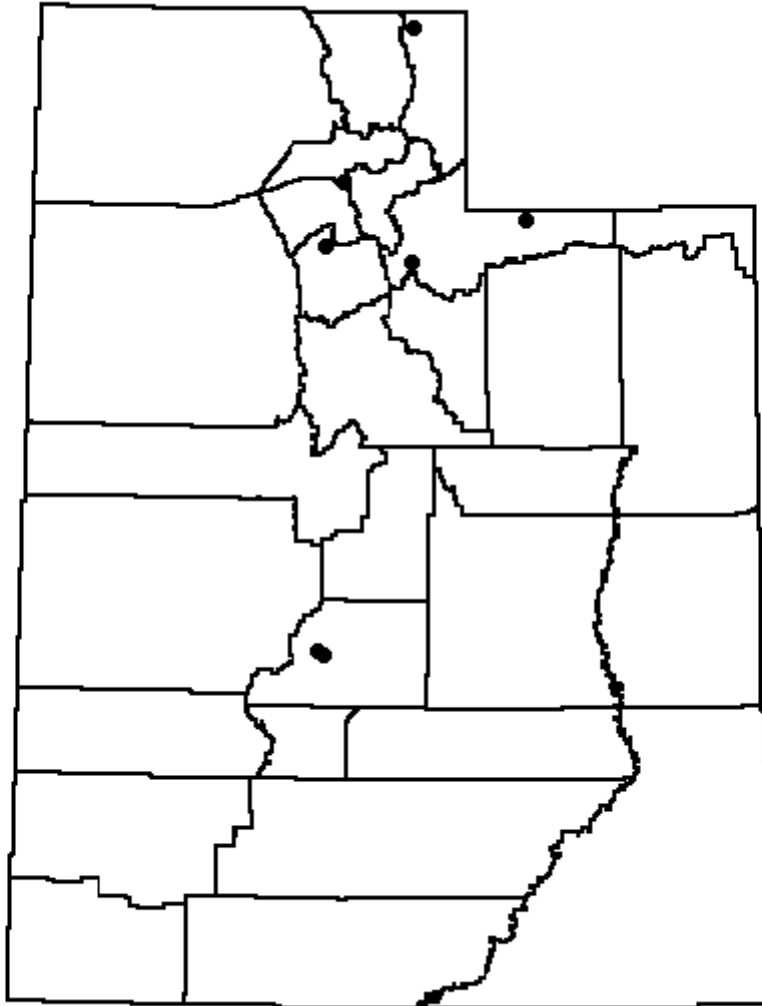


Figure 35. Utah localities for the glass physa (*Physa skinneri*) obtained from literature.

***Physa megalochlamys* Taylor, 1988**
cloaked physa

Utah Taxonomy

No subspecies have been proposed in this species.

Status in Utah

The only reported locality for this species in Utah is in Snake Valley in northwestern Millard County (less than 20 miles from the Nevada border) (Taylor 1988).

No information has been reported concerning the abundance of this species in Utah. Since this species has been collected in Utah only once, it is considered rare in this state.

Threats to this species in Utah are not known; however, the single Utah locality is in a very arid part of the state where human demands on water resources are great. Dewatering of natural aquatic sites for agricultural irrigation and degradation of aquatic ecosystems by various agents, especially the trampling of such sites by cattle, are factors that potentially threaten this species in Utah. The population trend of this species in Utah is not known. The species was not named and described until 1988, at which time the only known Utah locality was reported (Taylor 1988).

Monitoring of the only known Utah population is needed. Prospective searches for this species in other parts of the state are also warranted since the species is also known from one locality in south-central Colorado, a few localities in northwestern Wyoming, and one locality in southeastern Idaho less than 30 miles from the Utah border. The Idaho locality is particularly suggestive of the appropriateness of searching for this species in Cache and Box Elder counties.

Habitats Utilized in Utah

Taylor (1988), in the type description of this species, wrote: "Habitat: Mostly found in extensive marshes or ponds, fluctuating or even drying seasonally. Yet one locality is ... a large and perennial water body. Evidently the habitat range is poorly known." Although Taylor (1988) did not report the habitat of the single Utah locality, he did provide some habitat information for the Idaho locality, which

is very near Utah (less than 30 miles north of the state boundary); he described it as "... extensive *Typha-Scirpus* marshes ..." that in September were "completely dry".

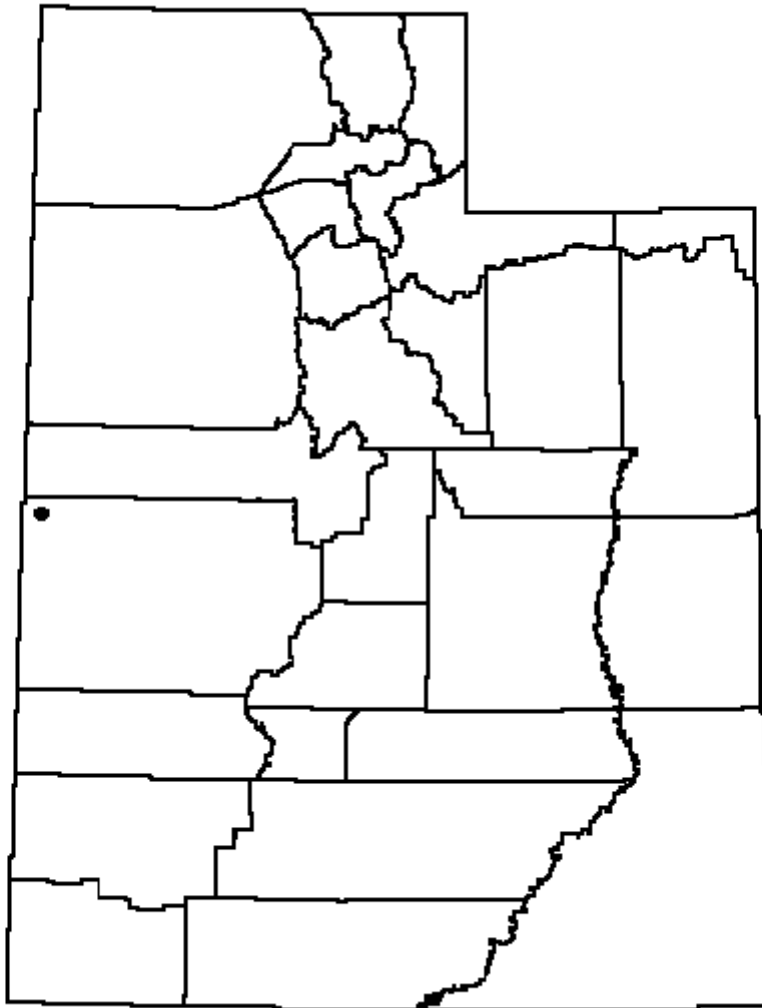


Figure 36. The Utah locality for the cloaked physa (*Physa megalochlamys*) obtained from literature.

***Physella microstriata* (Chamberlin and E. G. Berry, 1930)**
Fish Lake physa

Utah Taxonomy

Chamberlin and Berry (1930) described this species, which they named *Aplexa microstriata*, the type locality being "Fish Lake, Utah". Chamberlin and Jones (1929) had earlier assigned specimens of this species to *Aplexa hypnorum*.

No subspecies have been proposed in this species.

Status in Utah

There was formerly one occurrence of this species, now considered extinct. It was strictly endemic, so far as is known, to Fish Lake, Sevier County, Utah.

Although this species is now presumed to be extinct, Chamberlin and Berry in the type description (1930) reported: "Abundant ... in 1928 and in Sept., 1929."

Clarke (1991) noted that "management practices [at Fish Lake] ... include the widespread removal of vegetation in shallow water in the fall ... to improve boating and to reduce oxygen depletion in winter which might jeopardize desirable fishes" and commented: "It is quite possible that this species was driven to extinction by management practices designed to propagate sport fishes or to improve boating If so, it is another example (along with *Bakerilymnaea pilsbryi* [= *Stagnicola pilsbryi*, the Fish Springs marshsnail, which became extinct at Fish Springs National Wildlife Refuge, Juab County, Utah, presumably as a result of management practices intended to favor ducks]) of a species whose extinction has been caused by federal activities designed to promote the interests of sportsmen and tourists. Such policies must be carried out in the future only after proper impact studies have been done on rare and endemic species in the affected areas."

Sometime between 1929, when Chamberlin and Berry (1930) found it to be abundant, and 1989 and 1990, when Clarke (1991) searched for it 3 times and failed to find it, this species apparently became extinct.

Surveys of other high elevation lakes in the vicinity of Fish Lake and possibly even searches at the bottom of Fish Lake itself may be of value.

Habitats Utilized in Utah

The only habitat information provided by anyone who saw this species alive in the field was that contained in the type description by Chamberlin and Berry (1930), who reported only: "... in shallow water along shore of portions of Fish Lake, Utah"

Clarke (1991) has noted regarding the area of former occurrence of this species: "Fish Lake is at high elevation (8843 feet), 5.7 mi long (with axis SW to NE), 1.1 mi wide, and with depths exceeding 100 feet near its east side. Along the west side the bottom is of gravel and mud but with some rocks. During the summer the lake bottom becomes choked with *Spirogyra* and *Elodea* to depths of about 40 feet and dredging is impossible. The northeastern end of Fish lake is a shallow, muddy, vegetation-choked bay (Widgeon Bay) which is surrounded by a quaking bog."

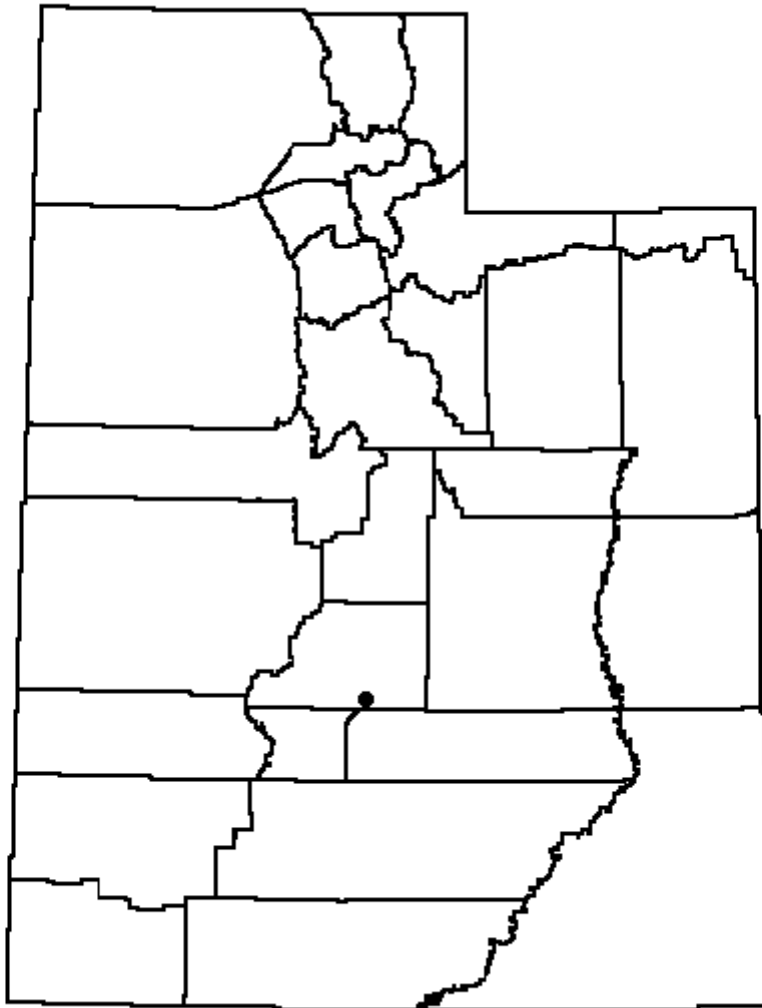


Figure 37. The Utah locality for the Fish Lake physa (*Physella microstriata*) obtained from literature.

***Physella utahensis* (Clench, 1925)**

Utah physa

Utah Taxonomy

Clench (1925) named and described this taxon from Utah Lake, placing it in the genus *Physa* as a subspecies: *Physa lordi utahensis*. In a letter to Ralph Chamberlin, however, Clench stated (as quoted in Chamberlin and Jones 1929): "I have since [the time of the type description] considered this [taxon] as rating full specific status." Chamberlin and Jones (1929) thus arranged it as a species, placing it, however, in the genus *Physella*. Henderson (1936)—and later Jones (1940a, Chamberlin and Roscoe (1948), and Russell (1971)—referred to the species as *Physa utahensis*.

Chamberlin and Jones (1929) called this species the Utah sinistral pond snail. Clarke (1991) applied to it the common name Utah Lake physella.

No subspecies have been proposed in this species.

Status in Utah

Two extant occurrences of this species in Utah are known, both in northeastern Box Elder County. The species inhabits three pools "located near Utah Hwy. 83, 14.3, 14.7, and 16.9 road miles W of Corrine, Cache [*sic*: Box Elder] County", and "Bar M Spring, Locomotor [*sic*: Locomotive] Springs area", also in Box Elder County (Clarke 1991).

Historically the species inhabited Utah Lake and associated springs (Chamberlin and Jones 1929, Jones 1940a), where it is now extirpated (Clarke 1991). Henderson (1936) reported this species from "a spring seven miles south of Junction, [Piute or Garfield County], Utah", which must be regarded as a historical occurrence, probably extirpated.

Russell (1971) reported the species from 4 of the springs making up the spring complex at Fish Springs, Juab County. It is unknown whether, but somewhat doubtful that, the species is extant at Fish Springs; moreover, Taylor (1986) seemed to doubt Russell's (1971) identification of this species at Fish Springs.

In the Museum of Zoology, University of Michigan, there reportedly are 4 lots of specimens collected live prior to 1950 in Utah (Clarke 1991). One of these lots is from Redden Spring, extreme southwestern Tooele County, the other 3 are

accompanied by only "inadequate locality data" but may be from the same locations as those reported by Clarke (1991) from north-central and northeastern Box Elder County.

It is possible that this species could be found in southeastern Utah in northeastern San Juan County in the Dolores River drainage. There are two collections of this species from Montrose County, Colorado, near the San Juan County, Utah, border. One of these lots is catalogue number 4978 in the University of Colorado Museum, from West Paradox Valley "in the Dolores River drainages" (Wu 1989). The other is in the Museum of Zoology, University of Michigan, "live-collected prior to 1950", from "Paradox Valley" (Clarke 1991).

Clarke (1991), "based on apparent population densities and areas occuppied [*sic*] in June, 1990", estimated populations of more than 2,100,000 individuals at one Utah site of occurrence (combining three associated smaller sites) and more than 100,000 at the other Utah site of occurrence. Despite these large population estimates, the pools inhabited are small (of the three combined as one occurrence, each is "between about 1/4 and 3/4 acre in area", and the other occurrence is in a pool somewhat larger). Furthermore, Clarke at times seems to overestimate populations (see account of *Oreohelix eurekensis*). In view of the small number of the pools inhabited and their small sizes, the abundance of this species, especially relative to other organisms, must be considered very low.

Potential threats to the known extant occurrences include introductions of fishes and dewatering. The cause of the loss of the presumably large population in or near Utah Lake is not known.

Current population trend in Utah is not known, but it is certain that the population has been radically reduced during the 20th century.

Inventory of several of the historical localities, especially Redden Spring, Tooele County, and springs at Fish Springs National Wildlife Refuge, Juab County, as well as search for the spring south of Junction near the Piute–Garfield County line, is needed, along with more extensive prospective surveys in northern and northeastern Box Elder County. This species should also be sought in eastern or northeastern San Juan County (e.g., in the Dolores River drainage and elsewhere).

Habitats Utilized in Utah

Clarke (1991) reported: "The 4 Utah sites which contained *P. utahensis* are all spring-fed pools. ... Each [of three of the sites] is a shallow pool between about 1/4 and 3/4 acre in area, each [of three] is well vegetated, andthe [*sic*] substrate

at each [of three] was of mud, sand, gravel, and/or rocks. ... [The fourth site] was an unusual, large, and very shallow pool virtually paved with flat rocks and choked with watercress."

Russell (1971), reporting this species from 4 of the springs in the Fish Springs complex, wrote: "This species was not seen alive in any of the marshes or canals but is known only from springs." Taylor (1986), however, seems to have doubted Russell's (1971) identification of this species at Fish Springs.

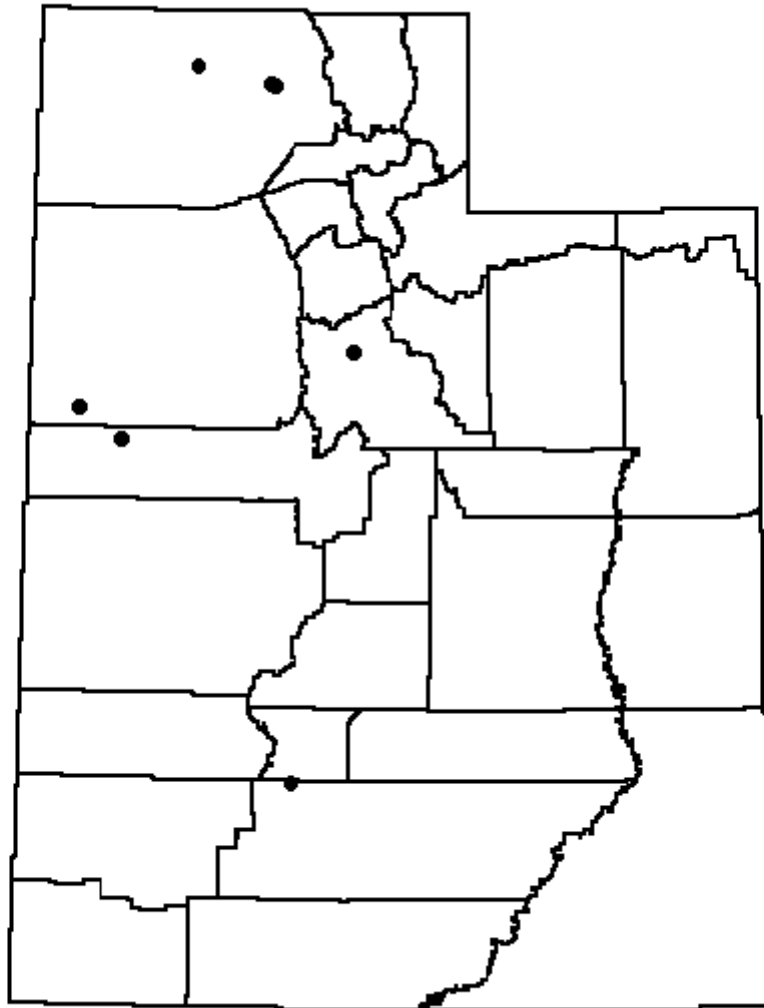


Figure 38. Utah localities for the Utah physa (*Physella utahensis*) obtained from literature.

***Physella virgata* (Gould, 1855)**

protean physa

Utah Taxonomy

Several authors (e.g., Woodbury 1929, Chamberlin and Berry 1929, and Chamberlin and Jones 1929) have discussed this species in Utah under the name in current use, *Physella virgata*. Others (e.g., Chamberlin and Berry 1930, Jones 1940a, Woolstenhulme 1942a, 1942b, Chamberlin and Roscoe 1948, and Russell 1971) have treated it as *Physa virgata*. Russell (1971) noted: "Whether or not *Physa virgata* is a valid species or represents an eastern species remains to be seen." Taylor (1986) has called this species in Utah *Physa squalida*, which he asserted "includes *P. virgata* as a synonym." It is likely that other names were used in discussing this species in Utah prior to 1929, but, without reexamination of specimens, such names may not be recognizable as synonyms of *Physella virgata* now.

Chamberlin and Jones (1929) applied the common name the striped physella to this species.

The subspecies that occurs in Utah is probably the type race *Physella virgata virgata*. It is also likely that the race *Physella virgata berendti* is represented in Utah, and it is possible that the race *Physella virgata concolor* may also be present in this state.

Status in Utah

This species is known, at least historically, from scattered localities throughout Utah. It has been reported from 18 localities in 12 counties: Washington County (Woodbury 1929, Chamberlin and Jones 1929, Jones 1940a), Iron County (Chamberlin and Jones 1929), Salt Lake County (Chamberlin and Jones 1929), Cache County (Chamberlin and Jones 1929), San Juan County (Chamberlin and Berry 1929, Chamberlin and Jones 1929), Grand County (Chamberlin and Berry 1929, Chamberlin and Jones 1929), Carbon County (Chamberlin and Berry 1929, Chamberlin and Jones 1929), Wayne County (Chamberlin and Berry 1930), Juab County (Russell 1971), Tooele County (Woolstenhulme 1942a), Wasatch (Woolstenhulme 1942b), and Summit (Woolstenhulme 1942b).

Little in the way of useful abundance data has been reported for this species in Utah.

Although threats to this species in Utah have not been reported, the dewatering and the alteration of aquatic habitats have been and continue to be widespread and common practices in this state. Some of the bodies of water from which the species was reported historically in Utah may no longer even exist. Population trend in this species in Utah is not known.

Inventory is needed to ascertain whether the several historical occurrences still exist as well as to determine the full extent of the distribution and abundance of this species in Utah.

Habitats Utilized in Utah

Woodbury (1929) reported: "This fresh-water snail is found in most of the clear water streams, springs, and ditches of Dixie [i.e., southwestern Utah] which are not subjected to corrosive [*sic*] floods. It is especially abundant in those sluggish streams or ponds where green algae abounds [*sic*] and upon which it appears to feed." Russell (1971) wrote: "Occurrence at Fish Springs: *Physa virgata* is generally found in springs and canals. This is the most widespread [mollusk] species at Fish Springs."

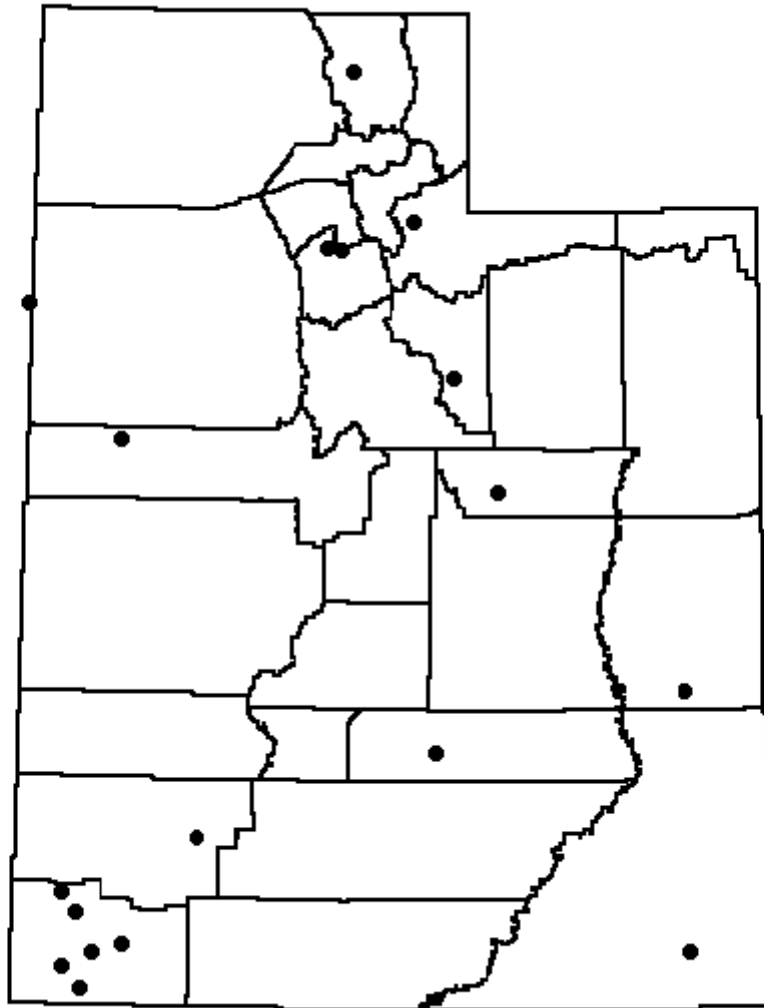


Figure 39. Utah localities for the protean physa (*Physella virgata*) obtained from literature.

***Physella zionis* (Pilsbry, 1926)**

wet-rock physa

Utah Taxonomy

This species was described and named by Pilsbry (1926) as *Physa zionis*, and this name was used by Jones (1940a) as well as Gregg (1940) and Ng and Barnes (1986). Chamberlin and Jones (1929) elevated the subgenus that Pilsbry (1926) had established solely for this species to generic status and thus arranged this species as *Petrophysa zionis*, a name also used by Chamberlin and Roscoe (1948).

Ng (1983), Ng and Barnes (1986), and Whipple (1987) called this species the Zion snail. Clarke (1991) referred to it as the Zion tadpole snail.

No subspecies have been proposed in this species; however, Pilsbry (1926) commented that "further collecting, keeping the shells of each colony separate, might possibly show that there are recognizable racial differences between snails of the more widely isolated colonies."

Status in Utah

This species is entirely endemic to 2 connected canyons, Zion Canyon and Orderville Canyon, along the North Fork of the Virgin River in Zion National Park, Washington County, Utah, a linear stretch of about 3.1 mi.

Ng and Barnes (1986) commented that this species "... has probably never existed in large numbers, and, in comparison to other snails, it may be considered rare." However, Clarke (1991), based on field work conducted in 1990, reported: "Estimated population sizes in [*sic*] Zion Canyon varied from about 200 snails (in one seep along the Gateway to the Narrows Trail) to about 250,000 snails in Dipper Seep and Cattail Seep (which are continuous and considered here as a single seep). A huge population of *P. zionis*, with about 5 to 10 million snails, was found along the south side of Orderville Canyon from its mouth to the third waterfall, a distance of about 0.8 miles." However, it should be noted that Clarke's estimates sometimes are inordinately high (see, for example, account for *Oreohelix eurekaensis*).

Although some natural mortality factors are known (e.g., predation, see Ng 1983, Whipple 1987) and others have been speculated (freezing, floods, and rock slides, see Whipple 1987), it is doubtful that such factors represent important threats to the continued survival of this species.

Chamberlin and Jones (1929) wrote: "Mr. [A. M.] Woodbury reported that [the cliff seeps near the type locality and upstream] had been stripped of snails by collectors on previous occasions, but that in a few days migration from above had soon renewed the supply."

Clarke (1991) has discussed some potential threats that would jeopardize the existence of the species: "Since *P. zionis* is not yet listed as Endangered, there is no legal restriction against the construction of new walkways (which might entail blasting of the cliffs on which *P. zionis* lives), dewatering of the area east of the Virgin River and south of Orderville Canyon (*P. zionis* depends on seeps there for its survival), or other activities which might be planned to accomodate [sic] increasing numbers of visitors to Zion National Park."

Population trend in this species is not known; likely it is stable.

Inventory elsewhere in Zion National Park or in surrounding areas, where springs or seeps are present along canyon walls, may be of value.

Habitats Utilized in Utah

This species inhabits seeps and "hanging gardens", mainly on the vertical sandstone walls of the narrow canyons through which the North Fork of the Virgin River flows (Pilsbry 1926, Ng and Barnes 1986). These wet canyon walls are covered with algae (Pilsbry 1926), and the "hanging gardens" are composed of such plants as maidenhair ferns, cardinal flowers, and columbines (Whipple 1987). Gregg (1940) found several colonies of this species on "[w]et faces of cliffs" and one colony "on horizontal surfaces of large flat rocks at the base of the cliff as well as on the perpendicular surface of the cliff."

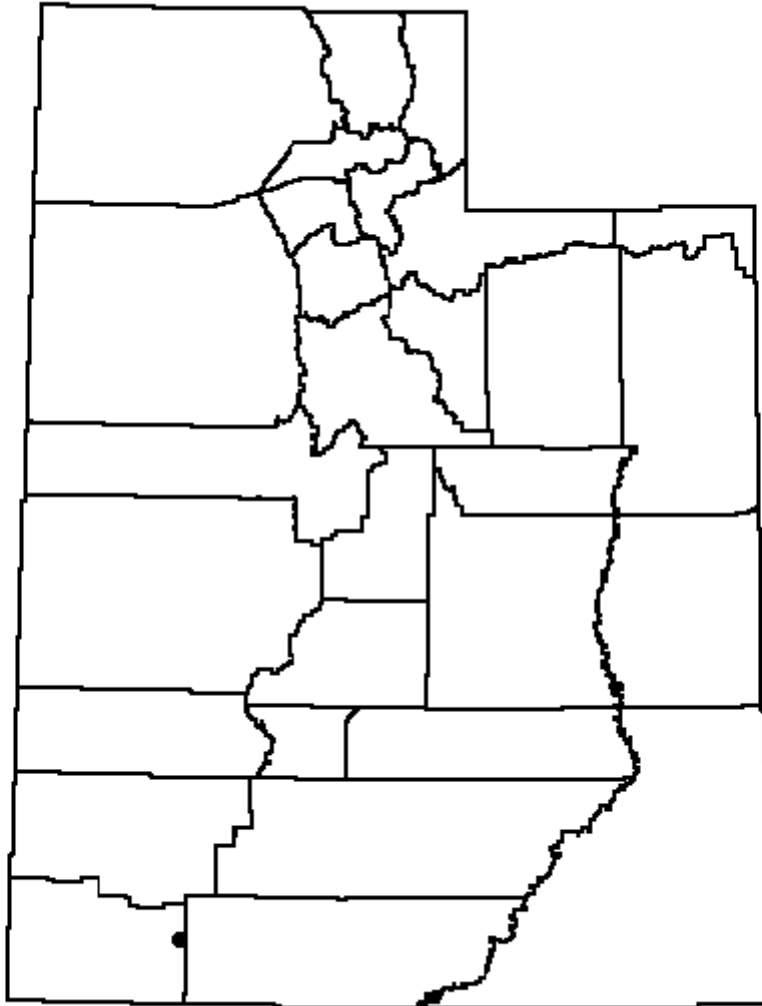


Figure 40. The Utah locality for the wet-rock physa (*Physella zionis*) obtained from literature.

***Aplexa elongata* (Say, 1821)**

lance aplexa

Utah Taxonomy

Except for misidentifications, the name applied to this species by all authors (Henderson and Daniels 1917, Chamberlin and Jones 1929, Brooks 1935, Brooks 1936, Jones 1940a, Woolstenhulme 1942a, Chamberlin and Roscoe 1948) discussing its presence in Utah has been *Aplexa hypnorum*.

Chamberlin and Berry (1930) reassigned Chamberlin and Jones' (1929) specimens from Fish Lake to their new species *Aplexa microstriata* (= *Physella microstriata*), and Taylor (1988) assigned some of Chamberlin and Jones' (1929) other specimens to *Physa skinneri* in his synonymy for that species. Chamberlin and Jones (1929) called this species the glossy pond snail.

Brooks (1935) named and described the subspecies *Aplexa hypnorum pilsbryi* from Uintah County, Utah, and this name was used by Brooks (1936) and by Chamberlin and Roscoe (1948), the latter authors also listing *Aplexa hypnorum hypnorum* as occurring in Utah. The race *pilsbryi* is no longer considered a valid taxon. No subspecies are now recognized in this species; however, the "morph *tryoni*" was recognized by Burch (1989), who noted its occurrence in Utah.

Status in Utah

Eight historical occurrences have been reported in Utah that have not subsequently, so far as is known, been reassigned to other species, though one of these is questionable for geographical reasons. This species is known from records, believed to be reliable, in 4 or perhaps 5 Utah counties, all of the localities being in north-central or northeastern Utah with the exception of one from the Mojave Desert in the extreme southwestern corner of the state, which seems doubtfully valid on geographical grounds.

Henderson and Daniels (1917) reported this species from 2 localities in Morgan County, and Woolstenhulme (1942a) documented another Morgan County record of this species from a locality not far from one of those mentioned by Henderson and Daniels (1917). Brooks (1935) reported this species from Uintah County, and the same author (Brooks 1936) repeated this locality and added a second Uintah County locality. Jones (1940a) listed 2 Utah localities, one in Weber County (but probably drift, of unknown age), the other in Washington County.

Of Chamberlin and Jones' (1929) 6 "[n]ew records" of this species in Utah, one was later assigned by Chamberlin and Berry (1930) to their new species *Aplexa microstriata* (= *Physella microstriata*), and 3 have been treated as misidentifications of *Physa skinneri* by Taylor (1988) in his synonymy for the latter species. This leaves 2 of Chamberlin and Jones' (1929) new records that presumably correctly pertain to *Aplexa elongata*: one in Weber County (near one of the localities given by Jones [1940a] but seemingly a much better record, probably based on the collection of live individuals) and one in Rich County.

Useful data regarding abundance are lacking in reports of this species in Utah. The species is believed to be uncommon in the state.

Although threats to this species in Utah have not been reported, since nearly all aquatic habitats in Utah are threatened in some way—by alteration, dewatering, pollution, and so forth—it is likely that this aquatic species, like many others, is threatened by such potential impacts. Population trend of this species in Utah is not known.

Inventory is needed to determine current status in Utah—extent of distribution and abundance. The possibility of its presence in southwestern Utah, as reported in the literature (Jones 1940a) should be examined.

Habitats Utilized in Utah

Habitats reported for specimens that represent, or possibly represent, this species in Utah are: "pools beside the railroad track" and "a small stream by the roadside" (Henderson and Daniels 1917), "swamps" (Chamberlin and Jones 1929, possibly this species), "pond" (Brooks 1935), and "swamp along Virgin River" (Jones 1940a, possibly this species).

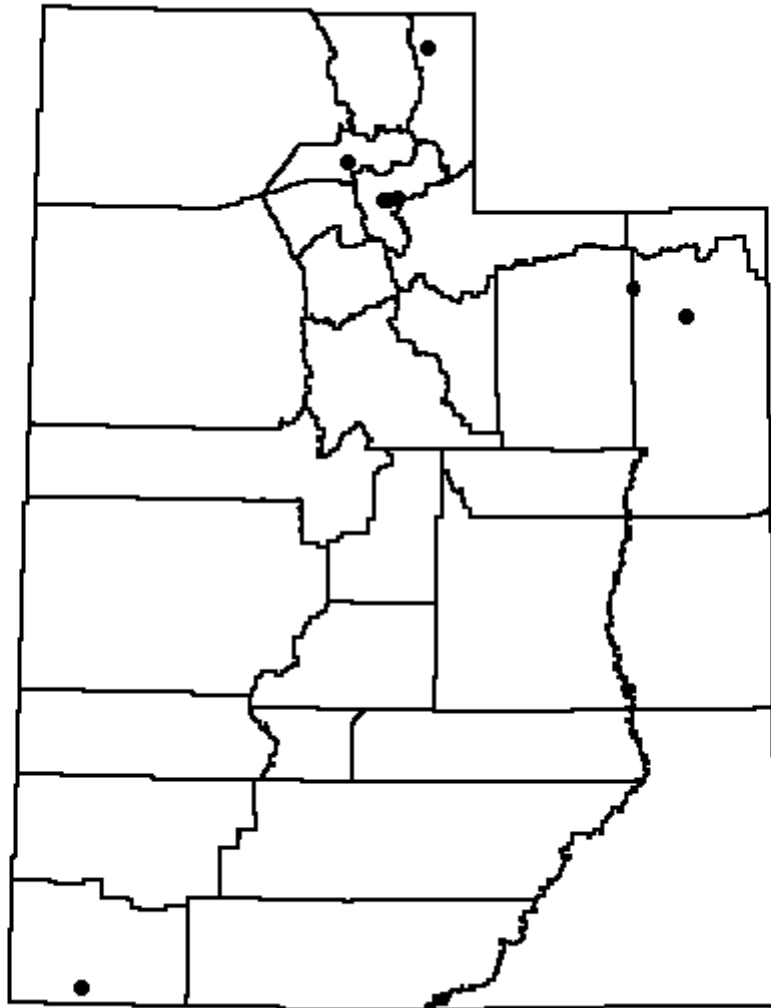


Figure 41. Utah localities for the lance aplexa (*Aplexa elongata*) obtained from literature.

***Helisoma newberryi* (I. Lea, 1858)**
Great Basin rams-horn

Utah Taxonomy

Although this species had originally been placed in the genus *Planorbis* when it was originally described, most authors referring to its occurrence in Utah (e.g., Call 1884, Henderson and Daniels 1917, Chamberlin and Jones 1929, Jones 1940a, and Chamberlin and Roscoe 1948) have placed the species in the genus *Carinifex*. Chamberlin and Jones (1929) called this species Newberry's snail.

The subspecies that occurred in Utah is the type (or nominate) race *Helisoma newberryi newberryi*. (The species is highly variable, even within local populations, and some of the subspecies and "forms" or "varieties" that have been named are no longer considered to be valid taxa, although 3 races, including the type race, are currently recognized.)

Status in Utah

There are no known extant occurrences of this species in Utah. Call (1884), regarding this species, reported: "In the Bonneville area [i.e., western Utah] it was discovered living in Utah Lake." Call's (1884) report apparently is the only record of this species having been found alive in Utah. Henderson and Daniels (1917) noted that Call (1884) had found the species living in Utah Lake and reported that they found dead shells of this species on "the shore of Utah Lake and adjacent slough, two miles south of Lehi, Utah." Chamberlin and Jones (1929) wrote of this species: "No living specimens were taken during our studies. In previous records it has been recorded living at Utah Lake [an obvious allusion to Call (1884)]." Thus, it appears that this species disappeared from the extant fauna of Utah sometime between 1884 (or earlier, Call [1884] having provided no dates for the Utah Lake observations) and 1916, when Henderson and Daniels (1917) collected in the state, and that historically it was extant only in Utah Lake, Utah County. (It should be noted that the species is very well known in Utah from fossil material, not discussed here.)

Henderson and Daniels (1917) noted: "... [T]he water [in Utah Lake] is not so free from salts as formerly, owing to the extensive use of water for irrigation. Cameron ... reports that the mineral content, chiefly sodium chloride, of the lake water increased from 300 parts of total solids per million parts of solution in 1883 [coincidentally about the time that Call had found this species alive in the lake] to

1,400 parts per million in 1903—a period of twenty years." Surprisingly, in view of the fact that they found no truly aquatic mollusks still living in the lake itself, they continued with the speculation: "It is not likely that the salinity will increase so much as to be fatal to fresh-water mollusks" It is quite possible that, if accurate, a nearly fivefold increase in salinity in the 20-year period that ended 13 years before they collected at Utah Lake would have negatively impacted the aquatic mollusks of Utah Lake. Furthermore, if the salinity of Utah Lake continued, during the 13 years following the determination in 1903, to increase at the rate that it had increased in the previous 20 years, then the salinity of the lake in 1916, when Henderson and Daniels searched for mollusks there, would have been 2,180 ppm total solids.

It is extremely doubtful that inventory for this species in Utah would produce more than fossil or sub-fossil material, which is abundant at some sites.

Habitats Utilized in Utah

Call (1884), the only author who reported finding this species living in Utah, found it "in Utah Lake" but did not provide any information regarding its habitat. Utah Lake is a large, shallow, somewhat saline freshwater lake.

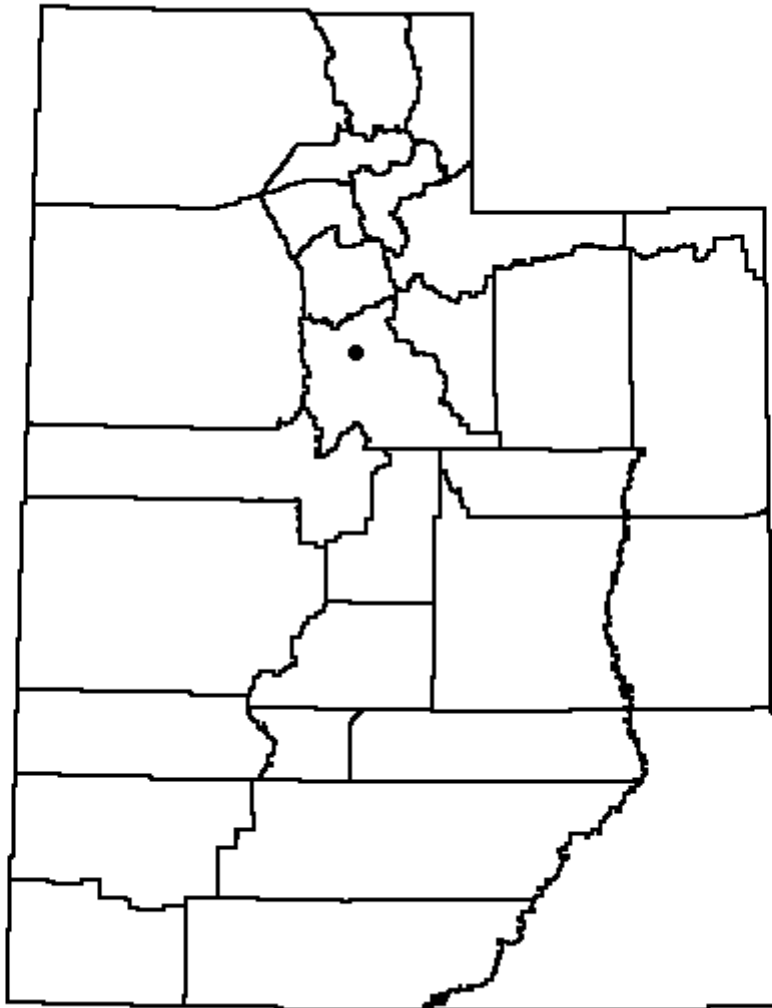


Figure 42. The Utah locality for the Great Basin rams-horn (*Helisoma newberryi*) obtained from literature.

***Planorbella binneyi* (Tryon, 1867)**
coarse rams-horn

Utah Taxonomy

Henderson and Daniels (1917) referred to this species in Utah as a race of *Planorbis trivolvis*. Chamberlin and Jones (1929) and Jones (1940a) called it in Utah a race of the same species, which they referred to as *Helisoma trivolvis*. Chamberlin and Roscoe (1948) regarded it as a full species, which they called *Helisoma binneyi*.

No subspecies are recognized within this species (i.e., the species is monotypic).

Status in Utah

Thirteen historical occurrences of this species in Utah have been reported; however, 2 of these are questionable. This species has been reported Utah from the north-central (Davis, Salt Lake, and Utah counties), south-central (Piute County), southwestern (Washington County), and questionably from the northeastern (Daggett County) parts of the state. (The 2 locality records from Cache County cited by Chamberlin and Jones [1929] and attributed by them to "Henderson and Daniels 1916 and 1917" apparently were incorrectly assigned by them to this species. Henderson and Daniels [1917] stated that these specimens were *Planorbis trivolvis hornii*.)

Little information concerning abundance of this species in Utah is available. Jones (1940a) listed, for Utah, 5 lots totaling 35 specimens as well as 3 lots of "several". It probably is not especially rare in the places that it occurs in Utah.

Although threats to this species in Utah are not precisely known, its disappearance from Utah Lake and probably other locations in Utah, together with evident threats to aquatic ecosystems in north-central Utah (especially along the Wasatch Front), the area containing most known Utah localities of the species, suggest that the species is threatened in this state. Alteration, degradation, and loss of wetlands and other aquatic sites are almost certainly among the most important threats to the species in Utah.

This species has disappeared from Utah Lake, where it was once widespread and apparently common; Utah Lake probably supported the largest population of this species in the state. Several other historical occurrences in Utah are also believed

to have been extirpated. Thus the species has declined and, in view of threats to aquatic ecosystems in the parts of Utah where it is known historically to have occurred, likely continues to do so.

Inventory is needed at or near sites where this species has been reported historically in Utah.

Habitats Utilized in Utah

Reported Utah localities have been mainly lakes, but a creek, canals, a pond, and a trout pond have also been mentioned (see especially Chamberlin and Jones 1929, Jones 1940a). Chamberlin and Jones (1929), writing of this species, commented: "They live on the bottom of lakes in quite stagnant water."

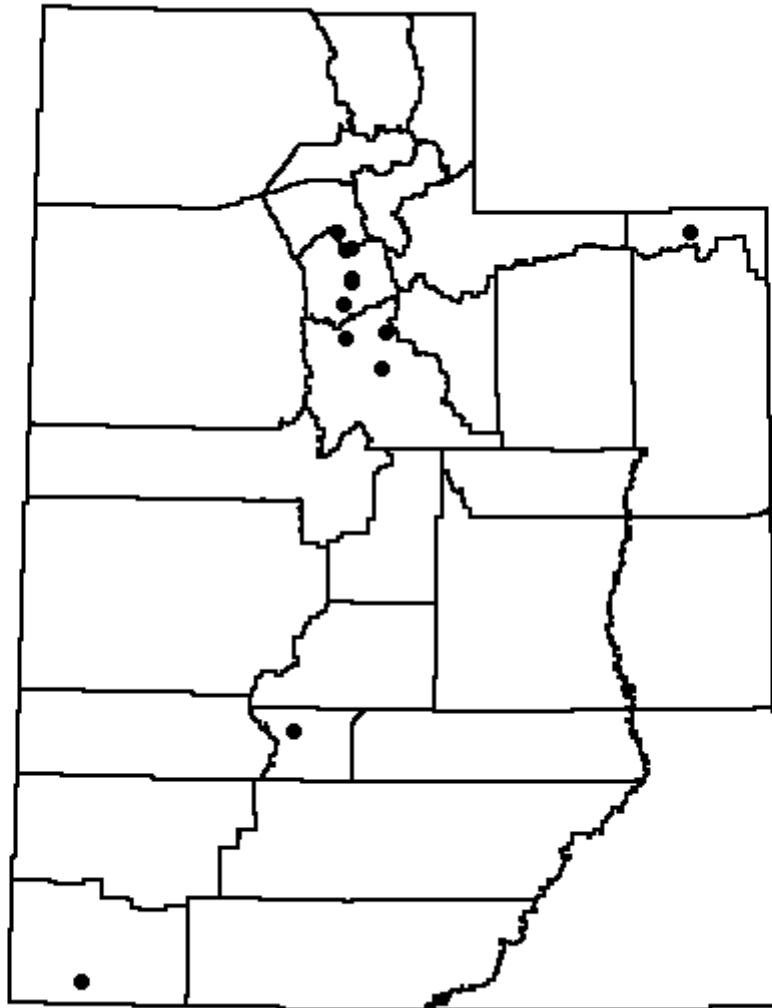


Figure 43. Utah localities for the coarse rams-horn (*Planorbella binneyi*) obtained from literature.

***Planorbella oregonensis* (Tryon, 1865)**
lamb rams-horn

Utah Taxonomy

Berry (1947) referred to this species in Utah as *Helisoma oregonense*. Baker (1945) also placed this species in the genus *Helisoma*.

No subspecies are recognized in this species.

Status in Utah

Only one occurrence in Utah is known (Berry 1947, which may be the same record as Baker 1945). This one reported occurrence (Berry 1947, and possibly Baker 1945) is from Salt Springs, a spring complex, including Blue Lake, on the Elko County, Nevada–Tooele County, Utah, boundary, but mostly in Utah.

Abundance of this species in Utah is not known but must be very low, for only one occurrence has been reported.

Threats to this species in Utah are not known. Potential threats likely include dewatering and the introduction of fishes and exotic mollusks. Population trend of this species in Utah is not known.

Inventory for this species is needed in northwestern Utah, particularly in western Tooele and Box Elder counties.

Taylor (1986) seems to have questioned the identification of this species at Salt Springs by Berry (1947) and implied that what Berry (1947) actually found was a related species *Planorbella duryi*. This latter species, which Taylor (1986) indicated was "not native to Utah, probably introduced by the aquarium trade", has not been reported from Utah by any other author, so far as is known.

Habitats Utilized in Utah

Taylor (1986) reported the habitat at a locality reported by Berry (1947) to support this species; Taylor (1986), however, doubted Berry's (1947) identification. Taylor described the site as a complex of springs and wrote: "Flowing water at the spring sources, and the immediately adjacent source pools, were the only places where

living mollusks were found. Even one-eighth mile downstream where flowing water ends at the saline ponds and pools, no living molluscs or fresh shells were found."

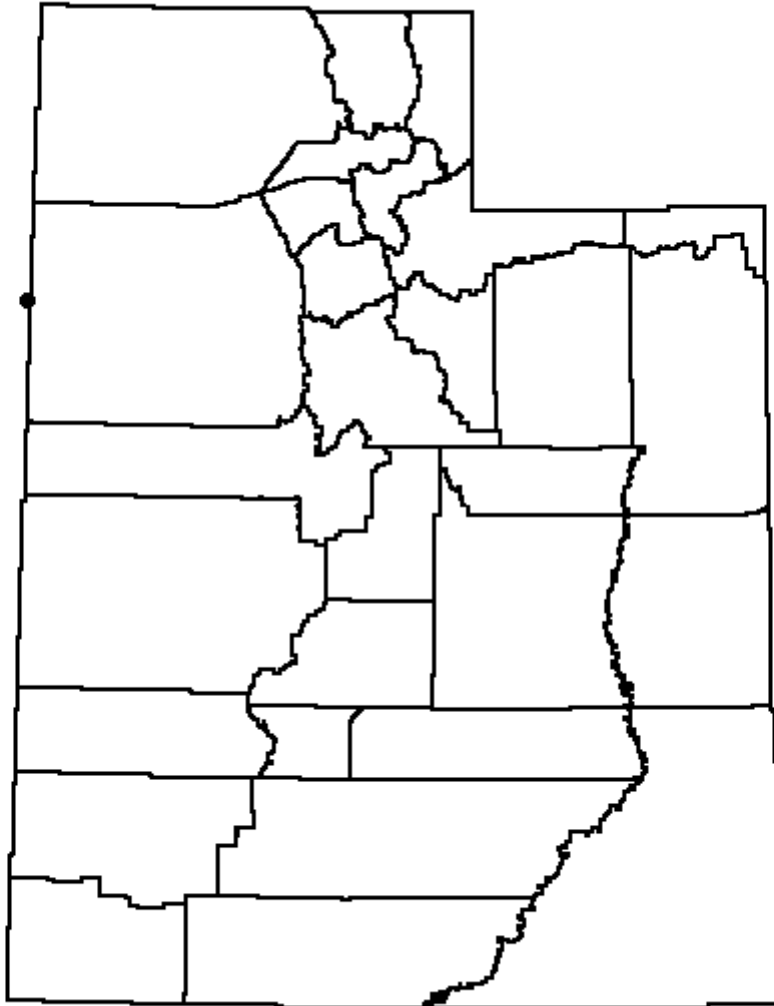


Figure 44. The Utah locality for the lamb rams-horn (*Planorbella oregonensis*) obtained from literature.

***Promenetus exacuus* (Say, 1821)**
sharp sprite

Utah Taxonomy

Henderson and Daniels (1917) referred to this species in Utah as *Planorbis exacuus*. Chamberlin and Jones (1929) called it, in Utah, *Menetus exacuus*, and applied to it the common name the keeled, discoid snail, and they considered Call's (1884) record of *Menetus opercularis* to be this species. Chamberlin and Berry (1930), Jones (1940a), and Chamberlin and Roscoe (1948) all referred to the species in Utah as *Menetus exacuus*, Chamberlin and Roscoe (1948) having indicated that it was in the subgenus *Promenetus*.

No subspecies are recognized in this species.

Status in Utah

About 7 or 8 historical occurrences of this species have been reported in Utah, all reports being from the north-central part of the state (Cache, Weber, Davis, Salt Lake, extreme western Summit, and Utah counties [Call 1884, Henderson and Daniels 1917, Chamberlin and Jones 1929, Jones 1940a]) except for one documented locality in south-central Utah (Sevier County [Chamberlin and Jones 1929, Chamberlin and Berry 1930]).

Jones (1940a) had records of 1 specimen of this species from each of 5 Utah localities, which suggests that the species was found to be rare in the places where it occurs in Utah. Chamberlin and Jones (1929), writing of this species, commented: "Comparatively rare in Utah Lake." The species is now considered extirpated from Utah Lake.

The extirpation of this species from Utah Lake is indicative of the threatened status of this species in Utah. All but one of the reported Utah localities for the species are in the portion of the state that is undergoing the most rapid and extensive development (i.e., north-central Utah). This is resulting in the loss and degradation of natural habitats, especially wetlands, which is almost certainly a threat to this aquatic gastropod. Even the 1 reported Utah occurrence of this species that is not in north-central Utah is from a locality, Fish Lake, that, though not obviously impacted by human activities, has experienced within this century the extinction of an aquatic gastropod species that was formerly endemic to this one water body (the Fish Lake physa, *Physella microstrata*), which suggests that

other native aquatic mollusks, including this species may not be secure in Fish Lake.

Though the population trend of this species in Utah is not known, the disappearance of the species from Utah Lake suggests that it is declining in this state.

Inventory is needed at the sites from which this species has been reported historically as well as elsewhere in Utah to determine its current status in the state.

Habitats Utilized in Utah

Most Utah records of this species have been from lakes (see, for example, Call 1884, Chamberlin and Jones 1929, Jones 1940a), though it has also been collected from a reservoir in Utah (Henderson and Daniels 1917).

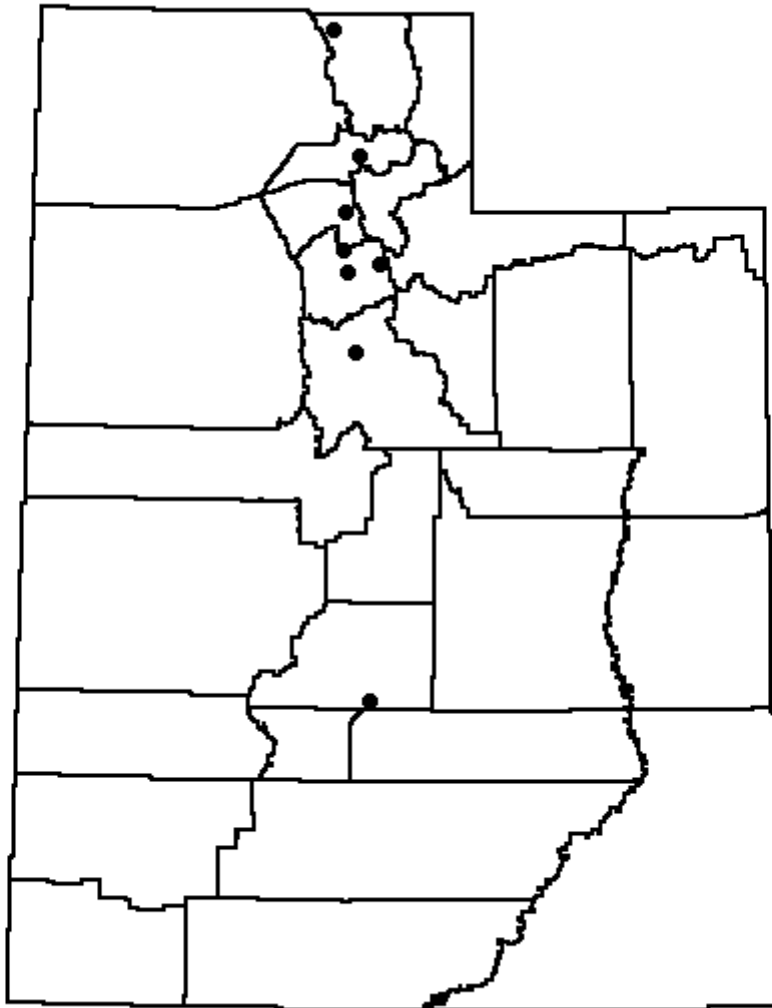


Figure 45. Utah localities for the sharp sprite (*Promenetus exacuon*) obtained from literature.

***Ferrissia rivularis* (Say, 1817)** **creeping ancyliid**

Utah Taxonomy

Call (1884) referred a specimen, almost certainly this species, from Utah to the genus *Ancylus* as "*Ancylus*, sp. undt." Russell (1971) called his Utah specimens, again almost certainly this species, *Laevapex californica*. Taylor (1986) called Utah specimens *Ferrissia californica*.

Many authors (e.g., Jones 1935, Jones 1940a, Chamberlin and Roscoe 1948) have referred to the species in Utah by its currently accepted name. Chamberlin and Jones (1929) referred to this species in Utah by its currently recognized name, except for its spelling in the text, where it appeared three times (p 170) as: "*Ferrisia* [sic] *rivularis*"; however, this appears to have been either a lapsus or a printer's error, for in their accompanying figure (Fig. 29, p 171) the name was hand-written correctly, and the name appeared correctly spelled in the table of contents (p ix), in their overview of molluscan classification (p 14), and in the index (p 197).

No subspecies are recognized in this species.

Status in Utah

There are 5 known occurrences of this species in Utah, all but 1 being historical. This species has been reported from 4 counties in Utah, all in north-central or west-central parts of the state: Utah County (Call 1884, Chamberlin and Jones 1929, Winger et al. 1972), Morgan County (Jones 1935), Juab County (Russell 1971), and Millard County (Taylor 1986).

Meaningful data regarding abundance of this species in Utah are not available. However, the species is believed to be very uncommon in the state.

Russell (1971) reported remains of what was apparently this species from a spring-fed marsh that had been drained and burned. Similarly, Taylor (1986) found apparently this species, only dead, and noted: "Charred ground and burned bases of sedge clumps show that the marsh has been burned over in the recent past; this is a probable cause for the few live specimens [of mollusks] that were found." Thus, the draining and burning of marsh habitats is a known threat to this species in Utah. Population trend of this species in Utah is not known.

Inventory is needed for this species throughout much of Utah—particularly in the northern and western parts of the state—to determine extent of distribution and abundance.

Habitats Utilized in Utah

No specific habitat data for this species in Utah have been reported. It has twice (Call 1884, Chamberlin and Jones 1929) been reported from Utah Lake, a large, shallow, somewhat saline freshwater lake with numerous springs around its margins. Only one of the two reports, however, provided any detail, that being Call's (1884) report, which stated that the single specimen had been dredged from the lake, thus implying the lake bottom, but Call (1884) did not specify that the specimen was live when collected.

Two Utah studies in which this species was reported (Jones 1935, Winger et al. 1972) dealt with rivers but provided no details.

Two other reports of this species in Utah (Russell 1971, Taylor 1986) were from spring-fed marsh complexes, but the species was not found alive in either study, and thus habitat cannot be known with certainty; Russell (1971) did suggest that "... perhaps, certain of the springs or canals are the habitat"

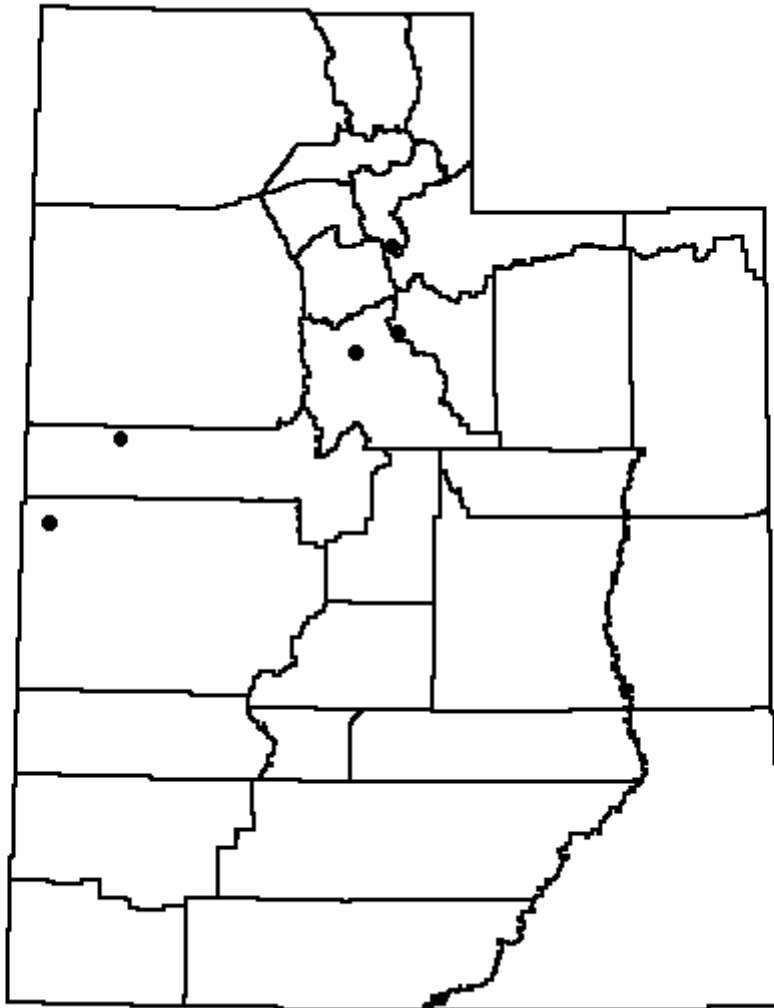


Figure 46. Utah localities for the creeping ancyliid (*Ferrissia rivularis*) obtained from literature.

***Gastrocopta pilsbryana* (Sterki, 1890)**
montane snaggleteeth

Utah Taxonomy

Reference to the occurrence of this species in Utah, using its currently accepted name, has been made by Pilsbry (1948) and by Chamberlin and Roscoe (1948). Both of these sources provided explanations of another name that has, in part, been used for this species in Utah: *Pupilla stoneri* Chamberlin and Jones, 1929. Chamberlin and Jones (1929) described a purported new species *Pupilla stoneri*, which they called Stoner's snail, based on 7 specimens collected in Cedar Canyon, near Cedar City, Iron County. However, the holotype of *Pupilla stoneri* was determined to be *Gastrocopta pilsbryana* by Pilsbry (1948), who wrote: "*Pupilla stoneri*, of which I have examined the type ... is wholly typical *G. pilsbryana*." Apparently 4 paratypes were designated by Chamberlin and Jones (1929), but Chamberlin and Roscoe (1948) reported that the paratypes of *Pupilla stoneri* were actually *Vertigo gouldii*. Earlier Henderson (1936) also had indicated that *Pupilla stoneri* is a synonym of both *Gastrocopta pilsbryana* and *Vertigo gouldii*.

If the subspecies *Gastrocopta pilsbryana amissidens* is regarded as valid, then a type race *Gastrocopta pilsbryana pilsbryana* exists, which would be the race that occurs in Utah.

Status in Utah

Two occurrences of this species are known in Utah; however, both of these occurrences are historical (11 September 1929 [Chamberlin and Berry 1930], and 1929 or earlier [Chamberlin and Jones 1929]).

This species is known in Utah from 2 localities in the southern part of the state: one in Garfield County (Chamberlin and Berry 1930), the other in Iron County (Chamberlin and Jones 1929, reported as the holotype of "*Pupilla stoneri*" [paratypes of "*Pupilla stoneri*" are yet another species]; see Pilsbry 1948 and Chamberlin and Roscoe 1948).

Abundance data have not been reported for this species in Utah. Since there are only 2 records of the species in Utah, it is seemingly rare.

Threats to this species in Utah are not known; however, it is thought not to be very threatened in this state. No information is available regarding population trend of this species in Utah.

The seeming rarity of this species in Utah may be the result of inadequate sampling. Inventory is needed to determine whether this species is extant at the 2 Utah localities from which it is known historically as well as to determine extent of distribution and abundance in Utah, particularly the southern part of the state.

Habitats Utilized in Utah

Chamberlin and Jones (1929) wrote: "The seven specimens of *Pupilla stoneri* [only one of which is now known to be *Gastrocopta pilsbryana*] were found in a collection from Cedar Canyon, approximately ten miles from the mouth of the canyon, on the south side, near a tributary stream that had very high banks. It was found under leaves and under stones" The specimen of *Gastrocopta pilsbryana* was "a weathered gray", suggesting that it was a not only an empty shell, but also somewhat old, which raises the question of whether it was found in the habitat in which it had lived or whether, instead, it had been displaced—perhaps washed down the canyon from some other location and habitat.

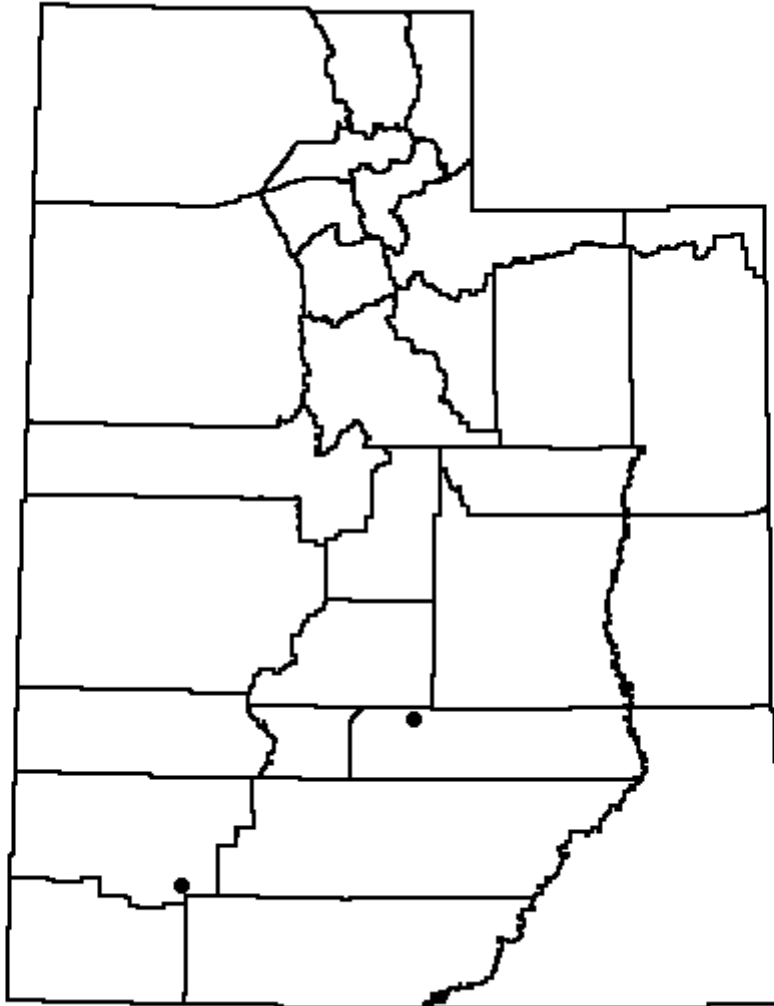


Figure 47. Utah localities for the montane snaggletooth (*Gastrocopta pilsbryana*) obtained from literature.

***Gastrocopta quadridens* Pilsbry, 1916**

cross snaggletooth

Utah Taxonomy

Apparently no subspecies have been proposed in this species.

Status in Utah

Only 2 occurrences of this species in Utah have been reported, and both of these occurrences were historical (Chamberlin and Berry 1930, Berry 1931). However, the seeming scarcity of Utah records may reflect lack of search effort for this species as well as the difficulty of finding it due to its inconspicuousness.

Chamberlin and Berry (1930) reported collecting this species at Fish Lake [Sevier County] in 1929, and this record was repeated by Pilsbry (1948). Berry (1931) found the species in Lamb's Canyon, Salt Lake County. The occurrence of the species in the south-central and north-central parts of the state suggests that it may occur throughout the Wasatch Mountains and the High Plateaus of Utah.

Abundance of this species in Utah is unknown. Berry (1931) reported for this species that "[o]nly one specimen was found"; however, he did not indicate whether the one individual was alive or, if not, how old or weathered the shell was. Although Chamberlin and Berry (1930) reported collecting this species, they did not mention the numbers or condition of specimen(s). Thus, it is not possible from these reports to ascertain whether the species has ever been found alive in Utah or even whether any relatively fresh material representing the species has been discovered in this state.

Threats to this species are not known, and its population trend in Utah likewise is unknown.

Inventory is needed to determine whether the species is extant at the two general localities of its historically reported occurrence (i.e., Sevier Lake and Lamb's Canyon). Prospective searches throughout the Wasatch Mountains and the High Plateaus, from Rich and Cache counties in the north to Washington and Kane counties in the south are needed. Surveys for this species would also be appropriate in other areas of the state, especially forested areas, to determine not only whether the species is extant in Utah but, if so, the extent of its distribution and abundance in the state.

As with other pupillids, this species is difficult to sample, living examples being especially difficult to detect. Because it is so easily overlooked, its seeming rarity and limited distribution in Utah may be the result of insufficient survey effort rather than actual scarcity in the state.

Habitats Utilized in Utah

No habitat information has been reported for this species in Utah. However, both of the two Utah localities of occurrence, Fish Lake (Chamberlin and Berry 1930, Pilsbry 1948) and Lamb's Canyon (Berry (1931), are at moderately high elevations. Berry (1931) noted that the elevation of Lamb's Canyon ranges "from about 7,500 feet at the mouth [of the canyon] to about 11,000 feet at its head" and mentioned: "The dense verdure and frequent rainfalls which occur in this canyon creates an ideal collecting ground for the conchologist."

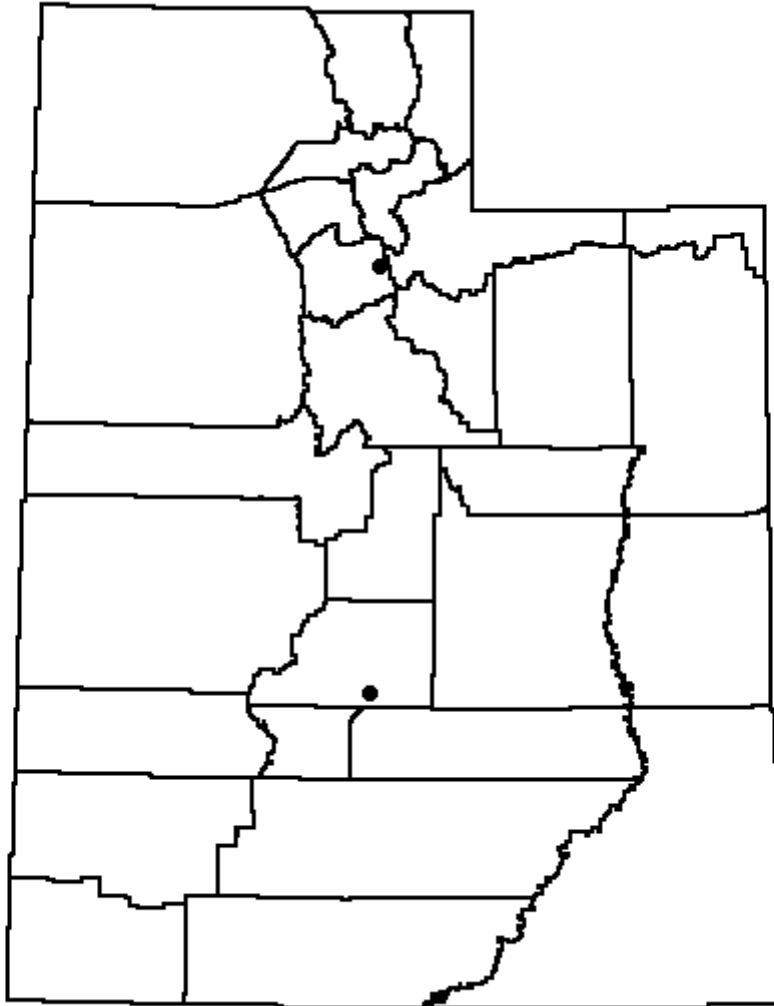


Figure 48. Utah localities for the cross snaggletooth (*Gastrocopta quadridens*) obtained from literature.

***Gastrocopta ashmuni* (Sterki, 1898)**
sluice snaggletooth

Utah Taxonomy

Few authors have mentioned this species in Utah; those that have done so (i.e., Chamberlin and Berry 1930, Gregg 1940, Chamberlin and Roscoe 1948) have referred to species using the name currently applied to it.

Although at least one subspecies has been proposed (*imperfecta*), as well as one "form" (*minor*) (see Pilsbry 1948), it is uncertain whether any infraspecific taxa are currently recognized in this species. If so, the subspecies that occurs in Utah likely would be the type race, *Gastrocopta ashmuni ashmuni*. However, it is probably best to consider this species to be monotypic, pending modern review of variation within the species.

Status in Utah

Only one occurrence, which is historical, is known in Utah (Chamberlin and Berry 1930, Gregg 1940). Here it has been reported only from Zion National Park, (Chamberlin and Berry 1930), presumably in Washington County, although parts of the park extend into Kane and Iron counties.

Although no abundance data have been reported for this species in Utah, the fact that the species has been reported only once from this state suggests that it is rare in Utah.

Threats to this species in Utah are unknown, but it is believed that the species is not very threatened in this state. No information regarding population trend of this species in Utah is available.

Inventory is needed to determine whether this species is extant at the only known historical locality in Utah, Zion National Park, and elsewhere to determine the extent of its distribution in Utah.

The seeming rarity of this species in Utah may be an artifact of the difficulty of finding such an inconspicuous species and of insufficient sampling effort.

Habitats Utilized in Utah

No habitat information for this species in Utah has been reported. (Pilsbry [1948], discussing this species in New Mexico and Arizona, commented: "Chiefly in broken country and foothills, but up to about 8,000 ft. in some places.") It is likely that, in Utah, the species is found in leaf litter in mesic canyons and other riparian areas.

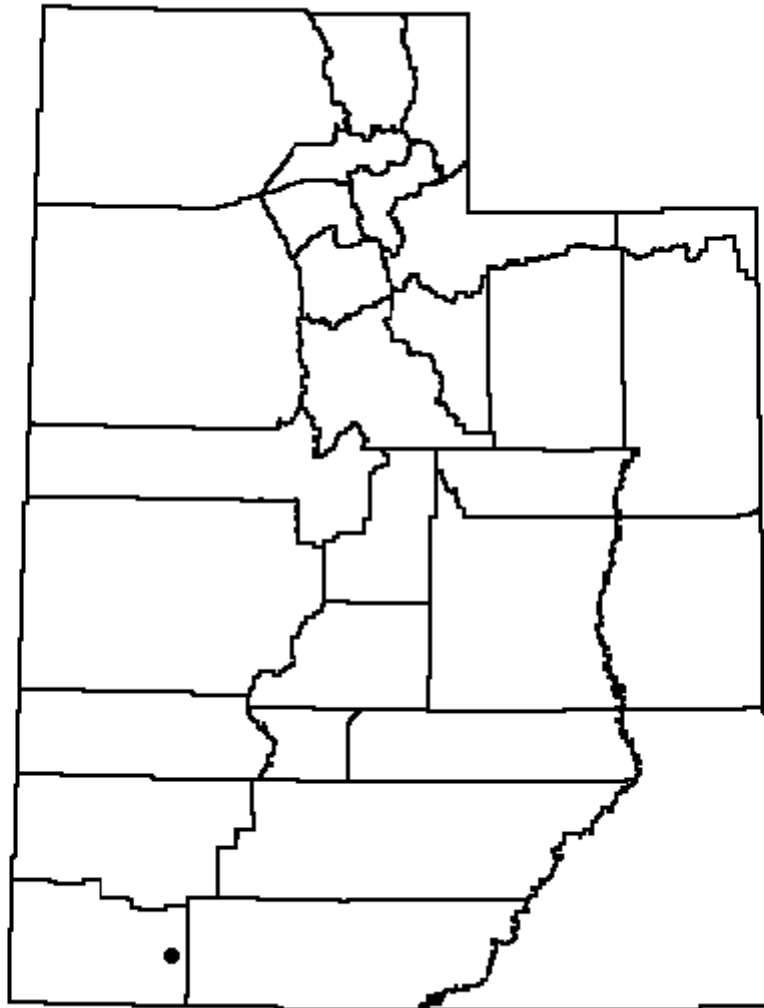


Figure 49. The Utah locality for the sluice snaggletooth (*Gastrocopta ashmuni*) obtained from literature.

***Gastrocopta pellucida* (Pfeiffer, 1841)**
slim snaggletooth

Utah Taxonomy

MacMillan (1946) and Pilsbry (1948) have referred Utah specimens of this species to the race *Gastrocopta pellucida parvidens*.

Status in Utah

This species is known from a single (historical) locality in the extreme east-central part of the state (south-central Grand County) (MacMillan 1946, Pilsbry 1948).

The single reported collection of this species in Utah was of 5 specimens (MacMillan 1946); however, the report of this collection did not specify whether any of the 5 individuals were alive when collected or even whether any of the specimens were fresh shells.

Threats to this species in Utah are not known but may be few. Destruction of riparian habitat in the arid part of Utah where the species has been found is likely its greatest threat in this state. Population trend in this species in Utah is unknown.

Inventory is needed both at the single historically reported Utah locality in Arches National Park, Grand County, and elsewhere in eastern and southern Utah.

Like other members of its family (Pupillidae), this species is small, inconspicuous, difficult to identify, and easily overlooked. As a result, its seeming rarity in Utah may be the product of inadequate sampling effort.

Habitats Utilized in Utah

MacMillan (1946) described the habitat at only known locality for this species in Utah: "... natural springs have created a small stream that flows for a mile through a narrow, winding, rocky canyon before it gradually disappears in the sandy soil comprising most of the floor of the wash. In the more sheltered parts are found small clumps of willows, and a thick carpet of grass forms the floor of these growths, together with twigs, willow leaves, and a few rocks."

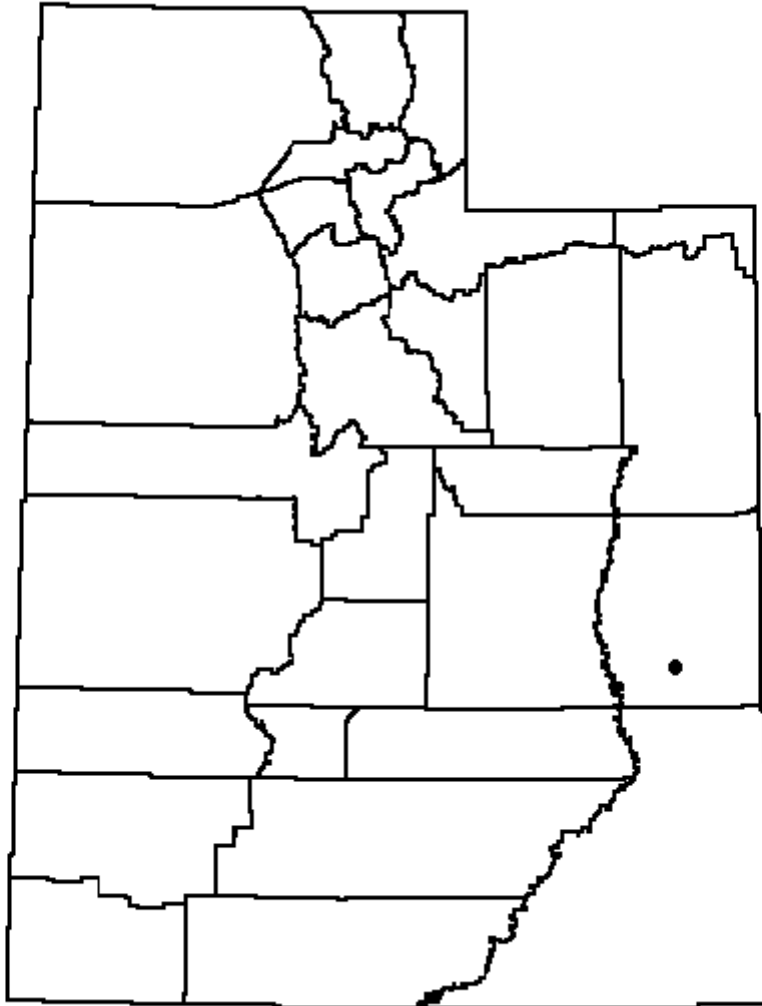


Figure 50. The Utah locality for the slim snaggletooth (*Gastrocopta pellucida*) obtained from literature.

***Pupoides albilabris* (C. B. Adams, 1841)**
white-lip dagger

Utah Taxonomy

Referred to by early authors (e.g., Woodbury 1929, Chamberlin and Jones 1929) by the synonym *Pupoides marginatus*. Chamberlin and Jones (1929) used the common name the plain-margined snail.

No subspecies are currently recognized.

Status in Utah

This species is known in Utah only from Zion National Park, probably Washington County. Woodbury (1929) collected two individuals in there, but, not recognizing them at the time when he collected them, he apparently did not keep detailed collection data and later did not know the exact localities or whether they were both collected at the same locality.

Woodbury (1929) stated: "This snail is apparently very rare in the [Zion National] Park. In four seasons of casual collecting, I have found two shells only."

Threats to this species in Utah are unknown but probably are not great. Population trends are unknown in Utah.

The only account of this species in Utah was published in 1929. Verification of its continued existence in Zion National Park is needed, and it should be sought elsewhere in southern Utah.

Habitats Utilized in Utah

In describing the areas where snails were found in Zion National Park, Woodbury (1929) stated: "The climatic conditions in Zion Canyon are so modified by the half-mile high precipitous walls that many cool shady nooks may be found separated from the exposed hot dry slopes by but the turn of a point or the round of a bend." Not realizing that he had collected this species along with some common species, Woodbury failed to note from which "nooks" this species was taken and was unable to provide more detailed habitat descriptions.

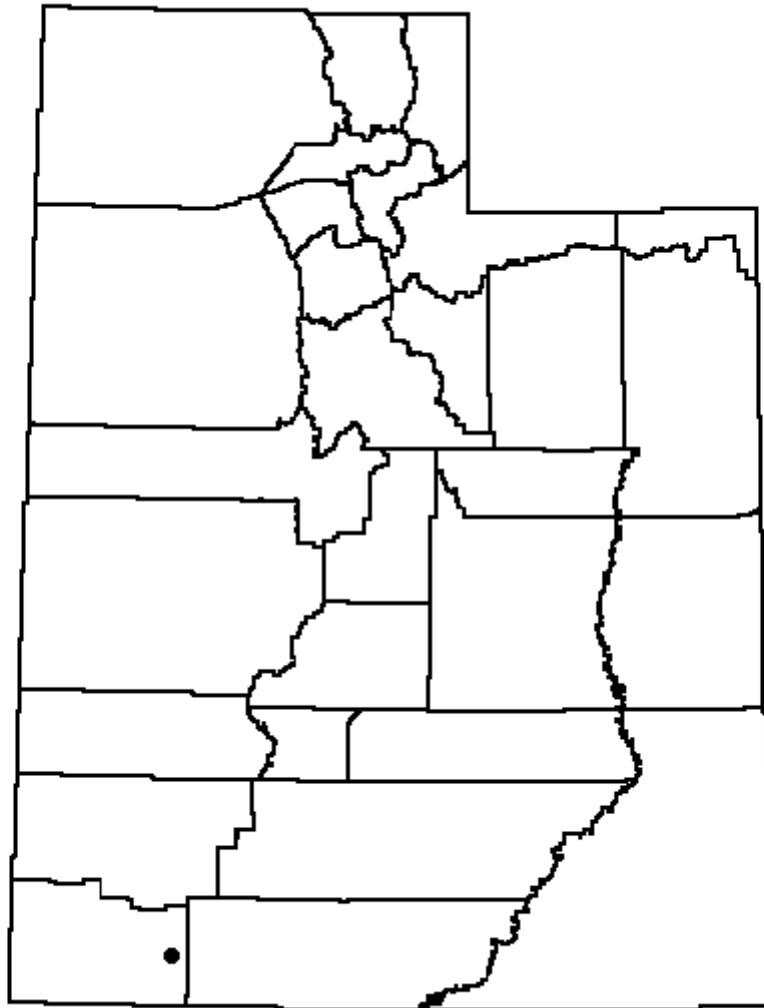


Figure 51. The Utah locality for the white-lip dagger (*Pupoides albilabris*) obtained from literature.

***Pupoides hordaceus* (Gabb, 1866)**
ribbed dagger

Utah Taxonomy

Chamberlin and Berry (1930), reporting Utah specimens later determined (Pilsbry 1948) to be this species, listed it simply as "*Pupoides*. ... Species uncertain, probably new." Chamberlin and Berry (1931) reconsidered the same specimens that they had reported in 1930; in their 1931 publication they noted that these specimens "were first referred to *P. hordaceus* (Gabb) and then indicated [Chamberlin and Berry 1930] as probably new The species is here described as new." In this publication (Chamberlin and Berry 1931) the new name that they proposed for their Utah specimens was *Pupoides eupleura*. Gregg (1942) reported more specimens from Utah as *Pupoides hordaceus*. Pilsbry (1948) reassigned the specimens reported by Chamberlin and Berry (1930, 1931) to *Pupoides hordaceus* and placed the name *Pupoides eupleura* in synonymy with the former name. Chamberlin and Roscoe (1948) listed the species in Utah as "*Pupoides hordaceus* [sic] (Gabb)" and indicated "*Pupoides eupleura* Chamberlin and Berry" as a synonym.

Apparently no subspecies have been proposed in this species.

Status in Utah

Three occurrences, all historical at best, have been reported in Utah (Chamberlin and Berry 1930 [as "*Pupoides* ... Species uncertain, probably new"], Chamberlin and Berry 1931 [as "*Pupoides eupleura*, sp. nov."], Gregg 1942, Pilsbry 1948). None of the reports of the species in Utah has specified whether any live examples were found; thus, extant status in Utah has not been documented, even historically.

All reports of this species in Utah may be from Garfield County (Chamberlin and Berry 1930, Chamberlin and Berry 1931, Gregg 1942, Pilsbry 1948), although one of these localities has been vaguely stated as being in "Wayne and Garfield counties" (Chamberlin and Berry 1930, Chamberlin and Berry 1931). It is not unlikely that the species occurs elsewhere in southern Utah.

Pilsbry (1948) mentioned that the species occurs in "San Miguel Co., Colorado, near the Utah line" and documented this locality as "Dolores canyon near mouth of Gypsum Creek, San Miguel Co. (Junius Henderson, 1914)"; this Colorado locality suggests that the species may be found in San Juan County, Utah, as

well. Records of this species from three of the four Arizona counties that adjoin Utah (Apache, Navajo, and Coconino counties, Arizona), where it is "most abundant" (Pilsbry 1948), also strongly suggests its occurrence in San Juan and Kane counties, Utah.

None of the reports of this species in Utah has provided any indication of numbers encountered or collected.

Threats to this species in Utah are unknown. Population trend in this species in Utah similarly is not known.

Inventory is needed to determine whether this species is extant in Utah at the three localities from which it is known historically. At least two of the three known Garfield County, Utah, localities are very near the boundary with Kane County; sites in adjacent Kane County should be searched for this species, and it should be looked for elsewhere in southern Utah, particularly in Wayne and San Juan counties, and also in Iron and Washington counties.

As with other pupillids, this is a minute and inconspicuous species, difficult to sample and easily overlooked. Thus, its rarity in Utah may be more apparent than real.

Habitats Utilized in Utah

None of the reports of this species in Utah has provided any information regarding habitat. Gregg's (1942) locality for the species, "along North Fork of Asay Creek", suggests a riparian situation; however, no details were given, and Gregg's specimen(s) may have been dead, perhaps drift material washed into and perhaps down the drainage.

Discussing the species throughout its range, Pilsbry (1948) wrote: "This is a species of the arid plateaus and foothills, not found in the humid upper zone of the mountains. It is known by specimens taken in the debris of streams or in Pleistocene or later deposits."

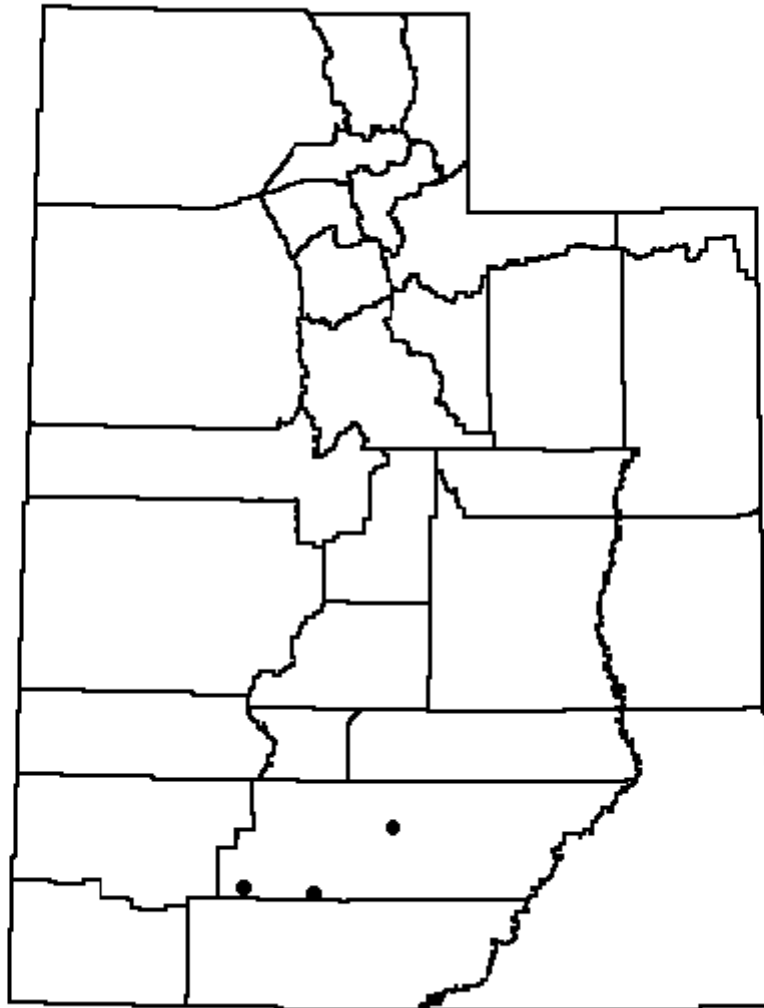


Figure 52. Utah localities for the ribbed dagger (*Pupoides hordaceus*) obtained from literature.

***Pupilla muscorum* (Linnaeus, 1758)**
widespread column

Utah Taxonomy

All 20th century authors who have discussed this species in Utah have used the currently accepted scientific name *Pupilla muscorum*. Chamberlin and Jones (1929) applied to it the common name the two-toothed snail.

Although it is not clear whether any subspecies of this species are currently recognized, if subspecies do exist within this species, it would possibly be the type (or nominate) race, *Pupilla muscorum muscorum*, that occurs in Utah. The species, however, could well be considered monotypic.

Chamberlin and Jones (1929) mentioned: "A form known as *Xerobia* [sic] Pilsbry, commonly ranked as a subspecies, is reported to be the common form in Colorado." Seemingly, Chamberlin and Jones (1929), who noted "[w]e failed to take this species [in Utah]" and clearly had not seen material from this state, were implying that this species, in Utah, may be represented by the nominal race *xerobia*. Pilsbry (1948), who had earlier named the form *xerobia*, reversed his earlier opinion, stating that *xerobia* should "... be regarded as an arid station hunger form rather than a true race." In modern terms, *xerobia* would be called an ecomorph.

Status in Utah

Only 5 occurrences have been reported in Utah, all of them historical, these being in Utah County (Ingersoll 1877, Chamberlin and Jones 1929), Sevier County (Chamberlin and Berry 1930), Salt Lake County (Woolstenhulme 1942a), Grand County (Henderson 1936), and San Juan County (Henderson 1936).

Abundance of this species in Utah is not known. Chamberlin and Jones (1929) and Chamberlin and Berry (1930), did not provide information regarding specimens. Woolstenhulme (1942a) reported a "new record" based on 1 Utah specimen but did not indicate whether it was alive when collected or, perhaps, a very old, dead shell.

Threats to this species in Utah are not known but are thought not to be great. The population trend of this species in Utah is unknown.

Inventory is needed to determine whether this species, not reported in Utah since

1942 (and even then based on one specimen of unknown condition—perhaps an old dead shell), is extant in the state as well as to determine the extent of its distribution and abundance. It should be sought throughout the Wasatch Mountains and the central High Plateaus and in other mountainous areas of Utah.

As with other species in the family Pupillidae, this species is minute and living examples are difficult to find; thus, it is easily missed unless special efforts are made to discover it.

Habitats Utilized in Utah

Habitat information for this species in Utah is lacking. However, two of the reported localities are canyons descending west from the Wasatch Mountains (Chamberlin and Jones 1929, Woolstenhulme 1942a) and another is a moderately high (approximately 8,000–9,000 ft elevation) location in the central High Plateaus (Chamberlin and Berry 1930). Part of the locality data reported by Woolstenhulme (1942a) was "Stepping Stone Spring", which, though this species is terrestrial and would not have been in the spring itself unless it was dead (drift) material, suggests a moist, probably riparian site.

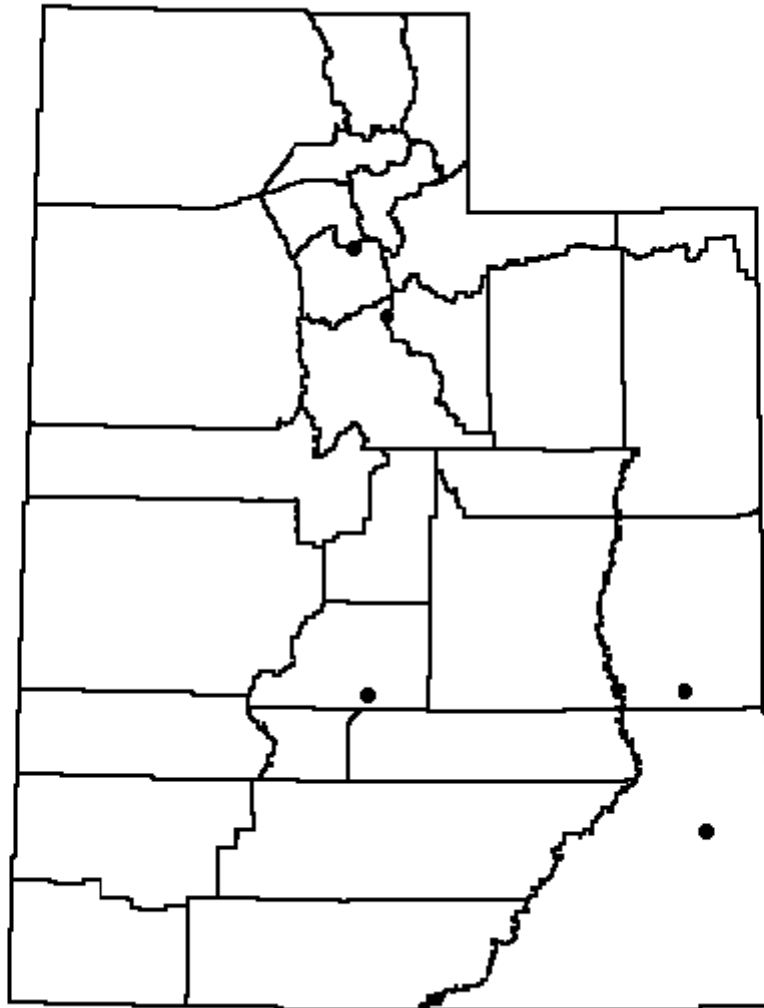


Figure 53. Utah localities for the widespread column (*Pupilla muscorum*) obtained from literature.

***Pupilla hebes* (Ancey, 1881)**
crestless column

Utah Taxonomy

Chamberlin and Jones (1929) called this species the plain columnar snail.

This species is monotypic.

Status in Utah

In Utah 10 historical localities have been reported, scattered throughout the state. Two localities are in north-central Utah: Chamberlin and Jones (1929) found this species in Rich County but commented that the identification of these specimens was questionable, and Jones (1940a) provided one locality in Salt Lake County. The remaining occurrences are from the southern third of the state, in San Juan, Wayne, Iron, and Garfield counties (Ferriss 1920, Chamberlin and Jones 1929, Chamberlin and Berry 1930, Gregg 1941a, 1941b, 1942).

The only mention of numbers of this species in Utah has been that of Jones (1940a), who listed 1 specimen.

Threats to the species are unknown. All records of this species in Utah were published prior to 1942. Probably the lack of recent data is not indicative of population declines, but rather the lack of recent inventory efforts for this minute species.

No recent reports of this species are available; the most recent published locality record is from 1942. Clearly, efforts to locate this species throughout the state are necessary to clarify its range and abundance.

This is a minute species, easily overlooked, and is likely underrepresented in most surveys.

Habitats Utilized in Utah

Descriptions of habitats used in Utah are not provided in the available literature.

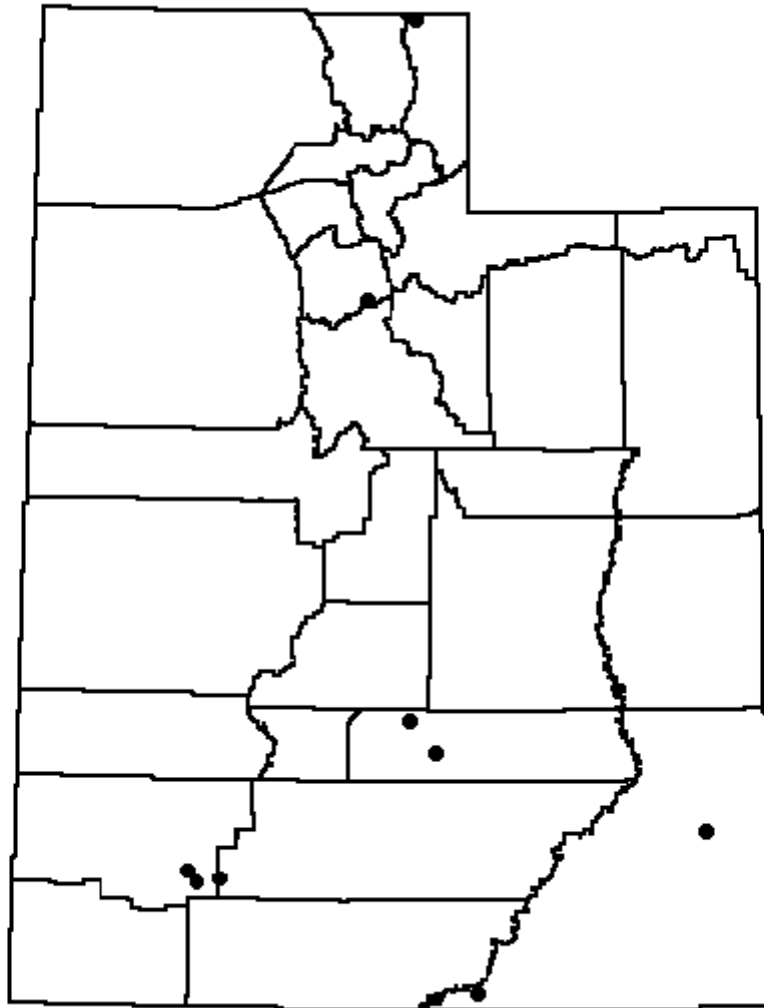


Figure 54. Utah localities for the crestless column (*Pupilla hebes*) obtained from literature.

***Vertigo ovata* Say, 1822**
ovate vertigo

Utah Taxonomy

Seemingly this species is represented in Utah by the type (or nominate) race, *Vertigo ovata ovata*.

Status in Utah

One historical occurrence of this species in Utah is known.

This species has been reported from only one historical locality in Utah: Fruita, Wayne County (Chamberlin and Berry 1930).

Abundance of this species in Utah is unknown but presumed to be low. The single, historical Utah record of the species (Chamberlin and Berry 1930, repeated by Pilsbry 1948) made no mention of numbers encountered or collected, and it is not known whether any living or fresh specimens have ever been found in this state. Pilsbry (1948) wrote that this widely distributed species "... is ... rarer and local in the ... western peripheral states of its range ...", which, in his account, included Utah.

Threats to this species in Utah are not known but are believed to be few.

Population trend in this species in Utah is unknown.

Inventory is needed to ascertain whether this species is extant at the one known Utah locality (Fruita, Wayne County). It should also be sought elsewhere in the Utah, particularly in the eastern half of the state.

This is another of the small, easily overlooked pupillids, which may be more common and widespread in Utah than records suggest.

Habitats Utilized in Utah

No habitat information was provided in the single, historical report (Chamberlin and Berry 1930) of this species in Utah.

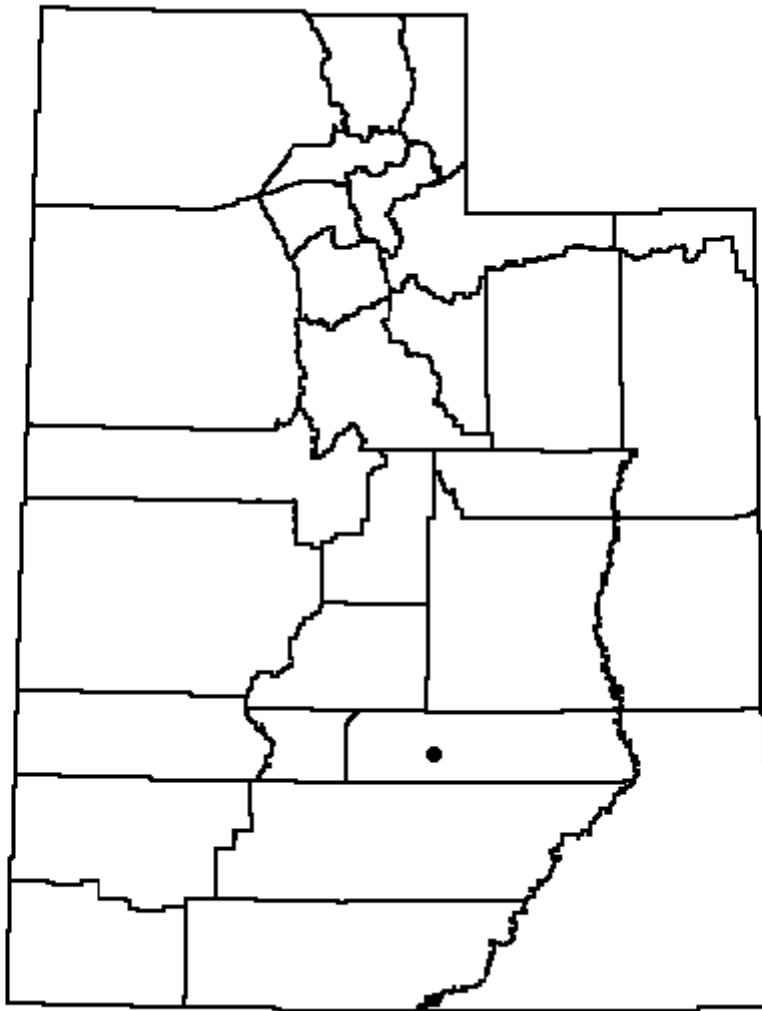


Figure 55. The Utah locality for the ovate vertigo (*Vertigo ovata*) obtained from literature.

***Vertigo elatior* Sterki, 1894**
tapered vertigo

Utah Taxonomy

No subspecies have been proposed in this species.

Status in Utah

This species has been recorded in Utah only once, the locality being 2.8 miles west of Vernal, Uintah County (Brooks 1936).

Abundance of this species in Utah is unknown but presumed to be low. Brooks (1936) did not mention how many were found nor whether any were found alive or as fresh shells.

Threats to this species in Utah are not known but are presumed to be few. Population trend in this species in Utah is unknown.

Inventory is needed to determine the current status of this species at the locality west of Vernal where it was historically collected. It should also be sought elsewhere in the Uinta Basin and in other regions of Utah.

Like all of members of the family Pupillidae, this species is difficult to detect and could be more common and widespread in Utah than the single, historical Utah record seems to suggest.

Habitats Utilized in Utah

No description of habitat was provided in the only report (Brooks 1936) of this species in Utah.

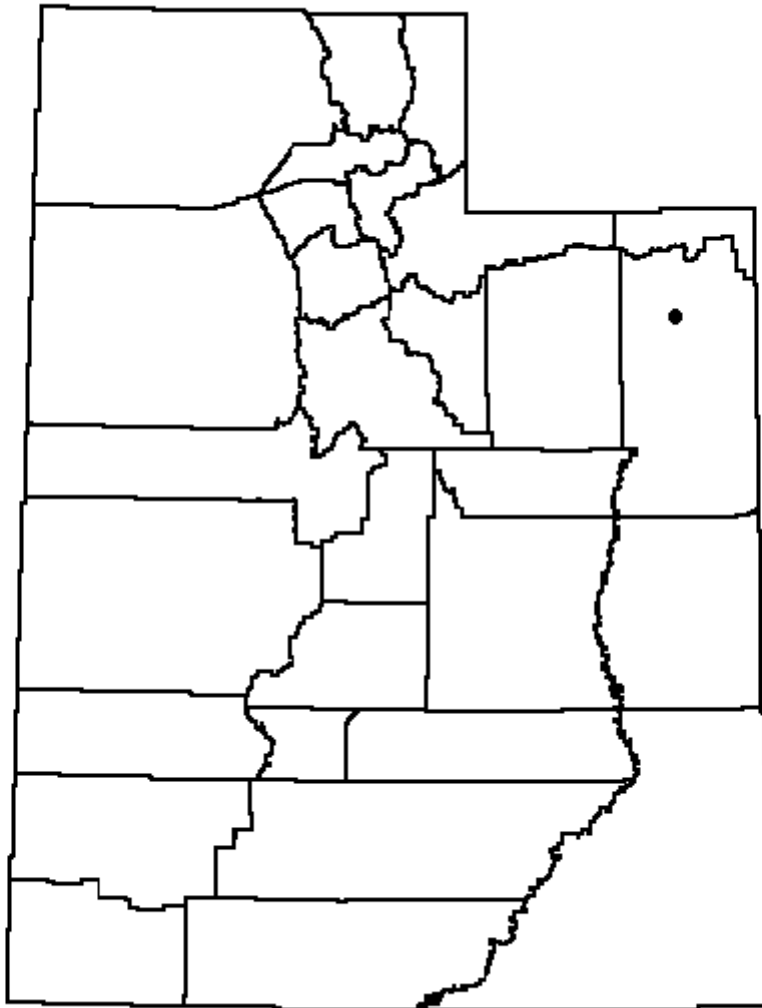


Figure 56. The Utah locality for the tapered vertigo (*Vertigo elatior*) obtained from literature.

***Vertigo gouldii* (A. Binney, 1843)** **variable vertigo**

Utah Taxonomy

In Utah this species as had a complex and very confusing nomenclatural history. Utah specimens have been called *Vertigo coloradensis* (Sterki 1892, Chamberlin and Jones 1929, Chamberlin and Berry 1929) and a race of that species, *Vertigo coloradensis arizonensis* (Chamberlin and Berry 1930); *Vertigo columbiana* var. *utahensis* (Sterki 1892) and *Vertigo columbiana utahensis* (Pilsbry and Vanatta 1900); *Pupilla stoneri* (in part: paratypes) (Chamberlin and Jones 1929); *Vertigo gouldii arizonensis* (Gregg 1941b, Gregg 1942, Chamberlin and Roscoe 1948); and *Vertigo gouldi coloradensis* (Pilsbry 1948) and *Vertigo gouldii coloradensis* (Chamberlin and Roscoe 1948). Thus, Utah specimens have been variously assigned to, or arranged as, a variety, 3 races, 4 species, and 2 genera.

Although Turgeon et al. (1988) listed this species (throughout its range) as "*Vertigo gouldi*", apparently following Pilsbry (1948), the correct spelling of the name is *Vertigo gouldii* (see Turgeon et al. 1998).

Two races of this species are believed to occur in Utah: *Vertigo gouldii arizonensis* and *Vertigo gouldii coloradensis* (see Chamberlin and Roscoe 1948).

Apparently all reported specimens of this species from southern Utah are of the race *Vertigo gouldii arizonensis* (see Chamberlin and Berry 1930 [as "*Vertigo coloradensis arizonensis*"], and especially Gregg 1941b and 1942).

Documentation of the race *Vertigo gouldii coloradensis* in Utah seems to be based on the specimen(s) collected by Henry Hemphill from "Box Elder Cañon, Utah, elevation 4500 feet" (Pilsbry and Vanatta 1900), also stated as "Box Elder canyon, northern Utah, at 4500 ft." (Pilsbry 1948).

Status in Utah

This species is known from 5 or 6 localities in Utah. All of these are historical and may even have been based material of prehistoric age; thus, the species is not known to be extant in Utah. Five of these locations are in 3 counties in southern Utah: Iron (Chamberlin and Jones 1929 as *Pupilla stoneri*, Chamberlin and Berry 1930 as *V. coloradensis*, Gregg 1941b), Garfield (Gregg 1942), and San Juan

(Chamberlin and Berry 1929 as *V. coloradensis*, Chamberlin and Jones 1929 as *V. coloradensis*). The sixth locality, "Box Elder Cañon, Utah, elevation 4500 feet" (Pilsbry and Vanatta 1900 as *V. columbiana*) is ambiguous, there being 5 Box Elder Canyons in 5 counties in Utah, 4 in northern Utah and 1 in the extreme southern part of the state. Pilsbry nearly half a century later (1948) repeated this locality as "Box Elder canyon, northern Utah, at 4500 ft." Very likely this locality is the Box Elder Canyon east of Brigham City in extreme eastern Box Elder County. Yet a seventh geographical reference is not useful—"Utah" (Sterki 1892).

Although all useable records of this species in Utah are, as summarized above, from the southern part of the state, it is quite possible that the species occurs in other parts of the state. The species is known from the adjacent states of Arizona, New Mexico, and Colorado and from Montana and British Columbia as well as many other states and provinces north and east of Utah (see Pilsbry 1948).

Data reflecting abundance of this species in Utah have unfortunately not been reported by the various authors who have documented its occurrence in the state. All of the reports are historical and many may have been based on dead shells, perhaps very old (i.e., prehistoric); for example, the specimens reported by Chamberlin and Berry (1929) and repeated in Chamberlin and Jones (1929) were "weathered" and may well have been prehistoric.

Threats to this species in Utah are not known but likely are not great. Population trend of this species in Utah is not known; in fact, it is not known whether a population is extant in Utah.

Inventory is needed to determine whether this species is extant in Utah, and, if so, to ascertain its distribution and abundance. It should be looked for in southern Utah, from which it has been reported, as well as elsewhere in the state; its distribution outside of Utah suggests that it may occur in almost any part of the state except perhaps the West Desert region.

This species, like other members of its family, is minute, inconspicuous, and difficult to find. Thus, available information regarding its occurrence in Utah may not adequately represent its status in the state.

Habitats Utilized in Utah

At least 4, and possibly 6, of the specimens reported by Chamberlin and Jones (1929) in the type description of *Pupilla stoneri* were actually *Vertigo gouldii* (see Chamberlin and Roscoe 1948 and Pilsbry 1948). Chamberlin and Jones (1929) reported the habitat of their nominal "*Pupilla stoneri*" as in a "canyon, on the

south side, near a tributary stream that had high banks. ... [Specimens were] found under leaves and under stones" However, several of their specimens, they noted, were "weathered", one "badly weathered", and thus may have been drift material washed into and down the stream bed from higher country. Thus, it is uncertain whether the habitat that they described accurately represents that inhabited by living individuals of *Vertigo gouldii* in Utah.

Gregg (1941b) characterized the area in which he collected a variety of mollusks, including *Vertigo gouldii*, as a "heavily forested rim which attains an altitude of 10,400 feet", "lofty forests of Engelmann spruce and alpine fir". Of one particular area where he focused his collecting and where he collected *Vertigo gouldii*, he wrote: "Here the altitude was 10,000 feet. There was a moderate amount of moisture most of the time and but a few yards away a series of springs in a swampy meadow formed brooklets which were tributaries to [a creek]."

Gregg (1942) described another area where he collected various gastropods, including *Vertigo gouldii*, "under pieces of rotten wood in well shaded places within a rather closely restricted area [near a creek]. The altitude at this point was about 8,000 feet."

Seemingly, this species has been found in Utah as low as 4,500 ft (see Pilsbry and Vanatta 1900, Pilsbry 1948).

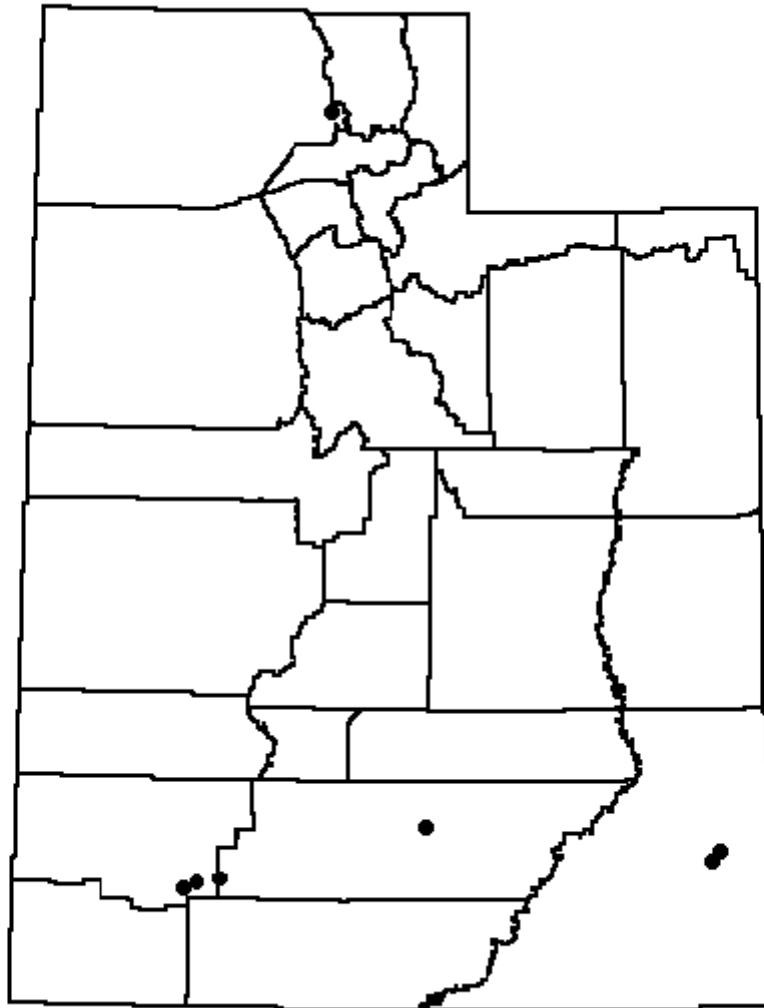


Figure 57. Utah localities for the variable vertigo (*Vertigo gouldii*) obtained from literature.

***Vertigo concinnula* Cockerell, 1897**
mitered vertigo

Utah Taxonomy

Roscoe and Roscoe (1955) referred to this species as "*Vertigo concinula*"; evidently this was a lapsus and not a typographical or printer's error, for they spelled the name consistently throughout their published paper, repeating this erroneous spelling 3 times.

No subspecies are known currently to be recognized in this species (i.e., the species apparently is monotypic).

Status in Utah

About 7 occurrences, all historical, are known in Utah. This species has been reported, historically, from montane situations in 4 Utah counties: Salt Lake (Chamberlin and Jones 1929, Berry 1931, Jones 1940a, Roscoe and Roscoe 1955), Sevier (Chamberlin and Berry 1930), Box Elder (Woolstenhulme 1942a), and San Juan (Pilsbry 1948).

Woolstenhulme (1942a) mentioned "several specimens" of this species from one locality in Utah. Jones (1940a) listed a total of 10 specimens from one Utah locality and "several" from another. Roscoe and Roscoe (1955) reported the species from 3 of 11 associated collecting stations in Utah but did not mention its numbers. Also, none of these authors indicated whether any of the specimens were alive when collected or even whether they were fresh (i.e., recently dead) material. Thus, abundance of living individuals of this species in Utah has not been reported.

Threats to this species in Utah are not known. Since all of the known Utah occurrences are in montane areas, habitat alterations resulting from timber harvest could represent a threat in this state. Population trend of this species in Utah is not known.

Inventory is needed to determine whether this species is extant at historically documented localities in Salt Lake, Sevier, Box Elder, and San Juan counties, and prospective searches are needed in other montane areas in the state to determine the extent of its distribution and abundance.

Since this species, like other members of its family (Pupillidae), is small and inconspicuous, and thus easily missed in sampling, it may be more widespread and abundant in Utah than existing records suggest.

Habitats Utilized in Utah

All known Utah records of this species are from montane areas, and many are from canyons. Berry (1931) listed this species among those that he collected in a canyon of which he wrote: "The altitude rises from about 7,500 feet at the mouth to about 11,000 feet at its head, a distance of only seven miles. The dense verdure and frequent rainfalls which occur in this canyon creates an ideal collecting ground for the conchologist." Roscoe and Roscoe (1955) reported this species from 3 (of 11) associated collecting stations: a "[r]avine ..., el. c. 8,850 ft., ... [q]uaking aspen litter, morainic rock"; "el. c. 8,950 ft., ... [q]uaking aspen and conifer litter, predominantly the former; morainic rock"; and "el. c. 8,950 ft., ... [i]n rotting logs in spruce–fir zone, dolomite rock."

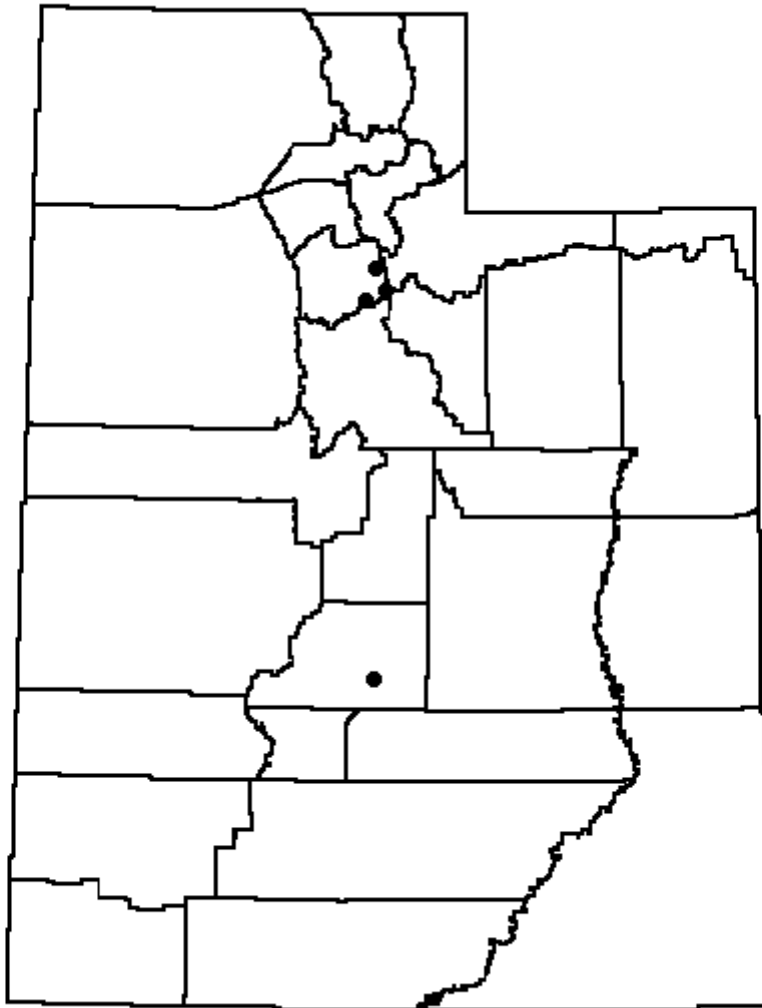


Figure 58. Utah localities for the mitered vertigo (*Vertigo concinnula*) obtained from literature.

***Vertigo modesta* (Say, 1824)**

cross vertigo

Utah Taxonomy

Originally this species was reported from the state as *Pupa corpulenta* by Binney (1886). It has also been called *Vertigo parietalis* in Utah (Jones 1940a). Chamberlin and Jones (1929) called the subspecies *corpulenta* the chubby snail and the subspecies *parietalis* the long-toothed snail.

Three subspecies, *Vertigo modesta insculpta*, *Vertigo modesta corpulenta* and *Vertigo modesta parietalis*, have been reported from Utah. The taxonomic validity of these subspecies, particularly *corpulenta* and *parietalis* is doubtful under the modern concept of a subspecies. According to Pilsbry (1939), "[t]here are numerous forms and mutations [of this species], some of them apparently subspecies characteristic of definite areas; others, such as *parietalis*, often occur associated with various races in the same populations. The subspecific taxonomy is more or less arbitrary." In discussing some morphological characteristics of *parietalis*, Pilsbry states: "As forms with the *parietalis* teeth occur in some places associated with both *corpulenta* and with shells having the contour of typical *modesta*, the subspecific status can hardly be allowed this form." The type locality for the taxon *parietalis* is Ogden Canyon, Weber County, but *corpulenta* is recorded from the same locality and possibly from the same specimen lot (Henderson and Daniels 1917).

Status in Utah

Eleven Utah occurrences of this species have been published. In north-central Utah, occurrences are concentrated in the central and southern portions of the Wasatch Range, in Weber, Salt Lake, Wasatch and Utah counties, and in the Uinta Mountains in Summit County, but other populations are known in Sevier County in central Utah and Kane and San Juan counties in southern Utah (Binney 1886, Pilsbry and Vanatta 1900, Ferriss 1920, Chamberlin and Jones 1929, Chamberlin and Berry 1930, Berry 1931, Jones 1940a, Woolstenhulme 1942a, 1942b). The San Juan County records represent the only occurrence of the subspecies *insculpta* in Utah.

Reported numbers of Utah specimens of this species are: 6 (Jones 1940a), 3 (Woolstenhulme 1942a), and 2 (Woolstenhulme 1942b).

Some populations, especially those in the Wasatch Mountains, are potentially threatened by development and associated loss of habitat.

No records of this species in Utah are available since 1942. Inventory in the Wasatch Mountains is needed in order to reveal distributional patterns and habitat use in this rapidly developing area. Inventory is also needed in southern Utah to clarify the distribution and taxonomic relationships of the subspecific taxa in the state.

This minute species is likely overlooked by most surveys. For example, Clarke (1993) conducted extensive surveys in the Ogden Canyon vicinity, the type locality of the taxon *parietalis*, but possibly overlooked *Vertigo modesta*, reporting only large species of the genus *Oreohelix*.

Habitats Utilized in Utah

Chamberlin and Jones (1929) reported specimens from "swampy ground".

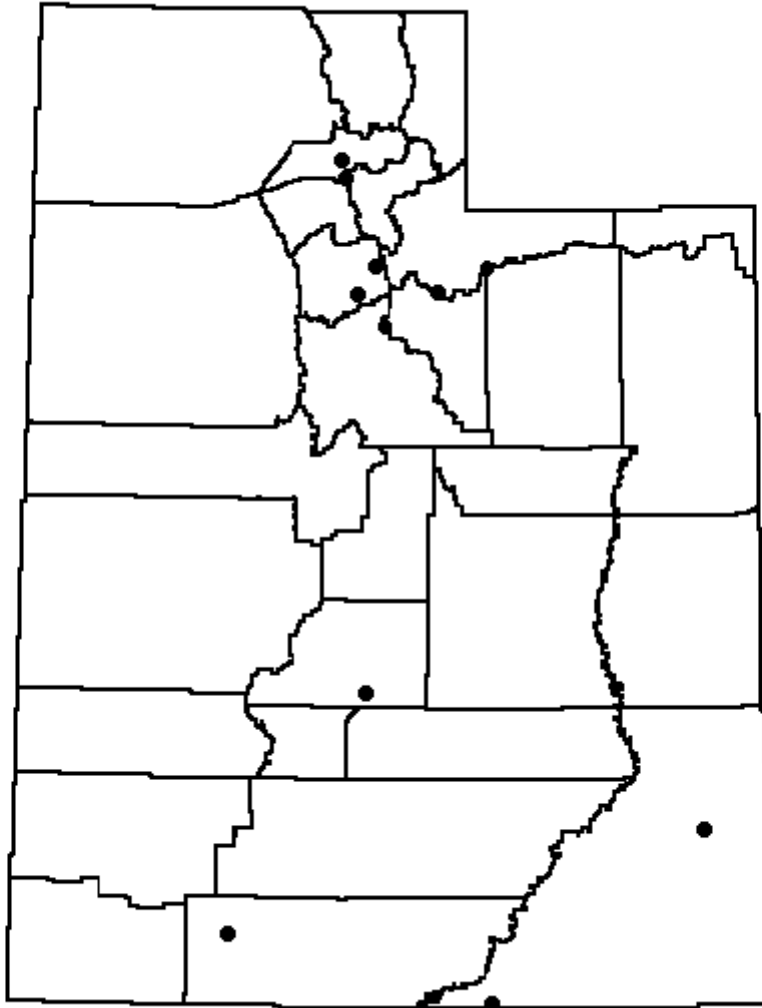


Figure 59. Utah localities for the cross vertigo (*Vertigo modesta*) obtained from literature.

***Columella columella* (Martens, 1830)**
mellow column

Utah Taxonomy

North American populations of this species were formerly known as *Columella alticola*, which has been submerged as a race of *Columella columella*. Chamberlin and Jones (1929), Berry (1931), Gregg (1942), and Pilsbry (1948) all referred to this species in Utah as *Columella alticola*, and Chamberlin and Jones (1929) applied to this species the common name the high altitude columnar snail.

The race of this species that occurs in North America is *Columella columella alticola*.

Status in Utah

Only 2 specific localities for this species are known with certainty in Utah—one in Salt Lake County (Berry 1931), the other in extreme southwestern Garfield County (Gregg 1942). A third Utah locality, "Chalk Creek" (Pilsbry 1948), is ambiguous, there being a Chalk Creek in each of several Utah counties; it seems likely, however, that the Chalk Creek listed by Pilsbry (1948) is in Summit County, Utah, near the Wyoming border.

Although Chamberlin and Jones (1929) referred to a record of this species from "Wasatch Mts. (Binney, 1878.)", the work by Binney published in 1878 that appears in their bibliography, although it does discuss this species (as *Pupa alticola*), apparently does not contain any record of this species from Utah. Berry (1931), too, made reference to "the indefinite record of Binney's 'Wasatch Mountains, 1878'."

None of the few reports of this species in Utah has provided useful information regarding its abundance. Gregg (1942) seemingly is the only author who has made any reference to its abundance Utah, stating that "[a] number of specimens [of this species] were taken ..." at the one locality where he found it. Since the species has very rarely been found in Utah, it is presumed to be rare in this state.

Threats to this species in Utah are not known but are presumed to be few. Habitat alteration resulting from timber harvest could be a threat, along with forest fire. Population trend of this species in Utah is unknown.

Inventory for this species is needed in montane areas throughout Utah. It should also be determined whether the species is extant at the two historical localities from which it has been reported in Utah.

This very small species, like other members of the family Pupillidae, is inconspicuous and difficult to detect; thus, it may be more widespread and perhaps more common in Utah than existing records suggest.

Habitats Utilized in Utah

Berry (1931) reported this species in Utah from a canyon of which he wrote: "The altitude rises from about 7,500 feet at the mouth to about 11,000 feet at its head, a distance of only seven miles. The dense verdure and frequent rainfalls which occur in this canyon creates an ideal collecting ground for the conchologist." Gregg (1942) reported that specimens of this species that he collected along a creek "... were found under pieces of rotten wood in well shaded places within a rather closely restricted area The altitude at this point was about 8,000 feet." Pilsbry (1948) listed a Utah locality at an elevation of "7500–8000 ft."

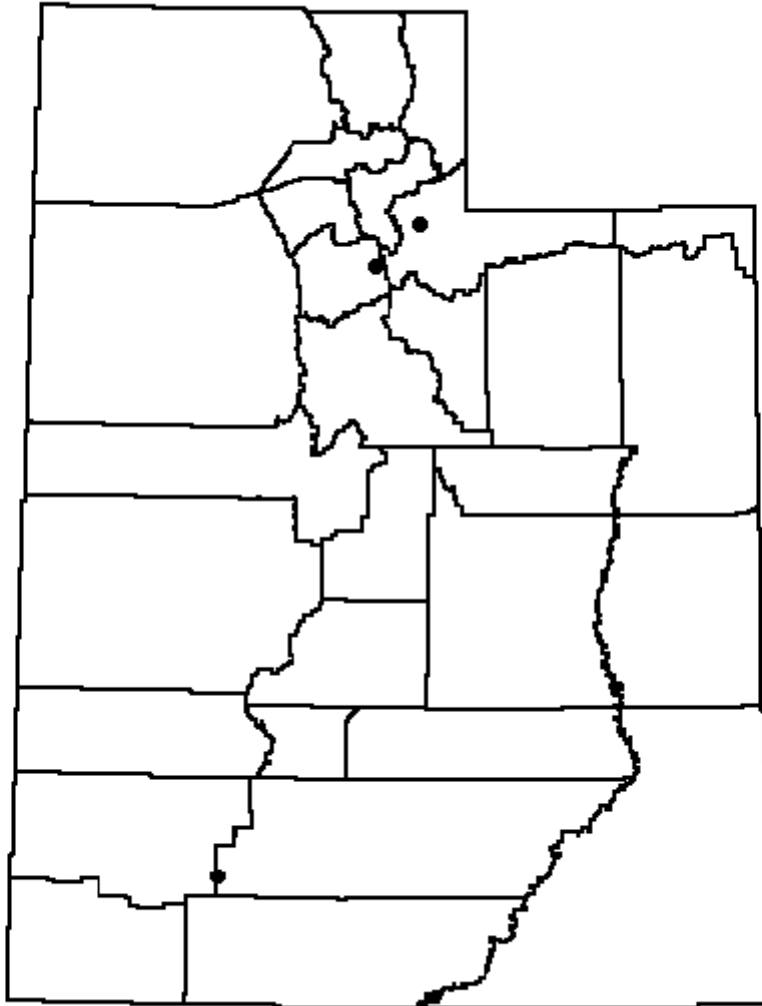


Figure 60. Utah localities for the mellow column (*Columella columella*) obtained from literature.

***Vallonia perspectiva* Sterki, 1893**
thin-lip vallonia

Utah Taxonomy

No subspecies are recognized in this species.

Status in Utah

This species is known in Utah from 3 localities in a fairly small area in the southwestern part of the state: 2 in extreme eastern Washington County (Gregg 1940) and 1 in extreme southwestern Garfield County (Gregg 1942).

Neither of the reports (Gregg 1940, 1942) of this species in Utah provided information regarding numbers of specimens collected or abundance; in fact, it is not known whether living representatives of this species have ever been found in this state.

Threats to this species in Utah are not known but are thought not to be great. Its population trend in Utah also is unknown.

Inventory is needed to determine whether this species is extant at the 3 Utah localities (two in Zion National Park, Washington County, one in extreme southwestern Garfield County) from which it has been reported historically. It should also be sought elsewhere in the state, especially in the southern parts.

This is a tiny gastropod species easily missed in mollusk surveys. In fact, Gregg (1940), reporting the species for the first time in Utah, commented with regard to it: "Previously overlooked because of its diminutive size." Thus, it is possible that the species may be more widespread in this state than records suggest.

Habitats Utilized in Utah

No habitat information has been reported for this species in Utah, although Gregg (1942), reporting the third Utah locality, did mention that it was along a creek, which suggests that he collected the species in a riparian situation.

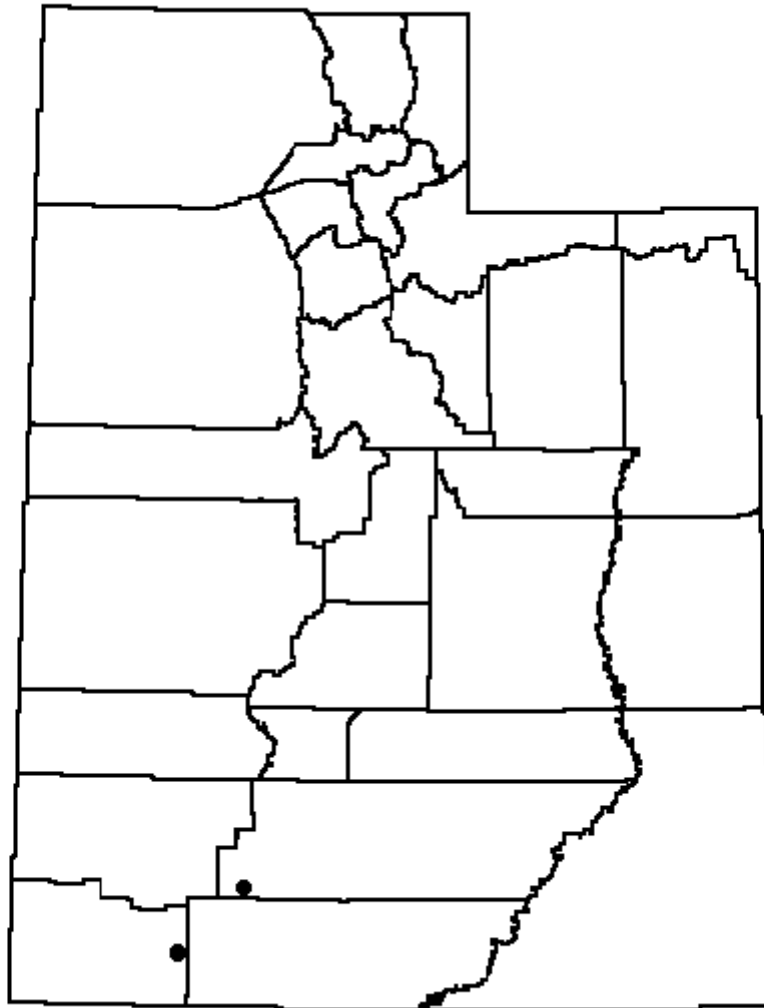


Figure 61. Utah localities for the thin-lip vallonia (*Vallonia perspectiva*) obtained from literature.

***Helicodiscus eigenmanni* Pilsbry, 1900**
Mexican coil

Utah Taxonomy

This species is represented in Utah apparently by the type (or nominate) race, *Helicodiscus eigenmanni eigenmanni*.

Status in Utah

This species is known in Utah from only 2 localities, both in San Juan County (Chamberlin and Berry 1929, repeated in Chamberlin and Jones 1929 and Pilsbry 1948).

Only 3 shells of this species are known to have been collected in Utah. Two of these were reported (Chamberlin and Berry 1929) as "weathered" shells, suggesting that they were quite old skeletal material. The third shell (Chamberlin and Berry 1929) apparently was fresh, but it is unclear whether the specimen was alive at the time of collection. Thus, it may be that the species has never been found alive in Utah.

Threats to this species in Utah are unknown but may be few, and population trend of this species in Utah is not known.

Inventory for this species is needed to determine whether this species is extant in San Juan County. Surveys for it elsewhere in southeastern Utah would help to clarify its distributional limits, as well as its status, in Utah.

Habitats Utilized in Utah

No habitat information was provided in the only report (Chamberlin and Berry 1929) of this species in Utah.

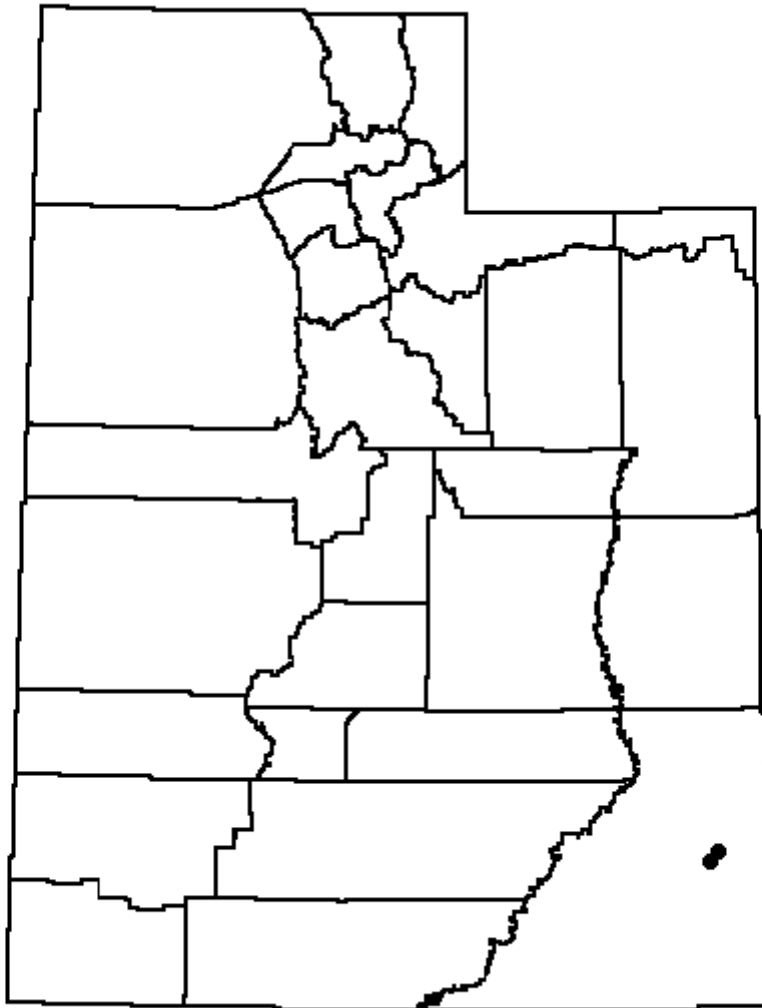


Figure 62. Utah localities for the Mexican coil (*Helicodiscus eigenmanni*) obtained from literature.

***Discus shimekii* (Pilsbry, 1890)**
striate disc

Utah Taxonomy

This species has been referred to, in Utah, as *Discus shimeki* (e.g., Jones 1940a, Woolstenhulme 1942a) and *Gonyodiscus shimeki* (e.g., Chamberlin and Jones 1929).

All populations in Utah have been assigned to the subspecies *cockerelli*; however, the validity of this taxon is questionable (Pilsbry 1948).

Status in Utah

Eight Utah localities have been published. It is known from San Juan, Garfield, Sevier, Piute, and Wayne counties in southern Utah and Daggett and Cache counties in northern Utah (Ferriss 1920, Chamberlin and Jones 1929, Chamberlin and Berry 1930, Jones 1940a, Woolstenhulme 1942a).

Very few Utah specimens have been reported; Chamberlin and Jones (1929) mentioned 6 specimens including "one weathered specimen", Jones (1940a) listed 1 specimen, and Woolstenhulme (1942a) reported 1 specimen.

Threats to this species in Utah are not known, and data are not sufficient to assess population trends; few Utah records have been published, the latest being in 1942.

Inventory is needed throughout the state to determine Utah distribution and habitat.

Habitats Utilized in Utah

According to Chamberlin and Jones (1929) "[this species] is a high-altitude form, occurring usually above 8,000 feet."

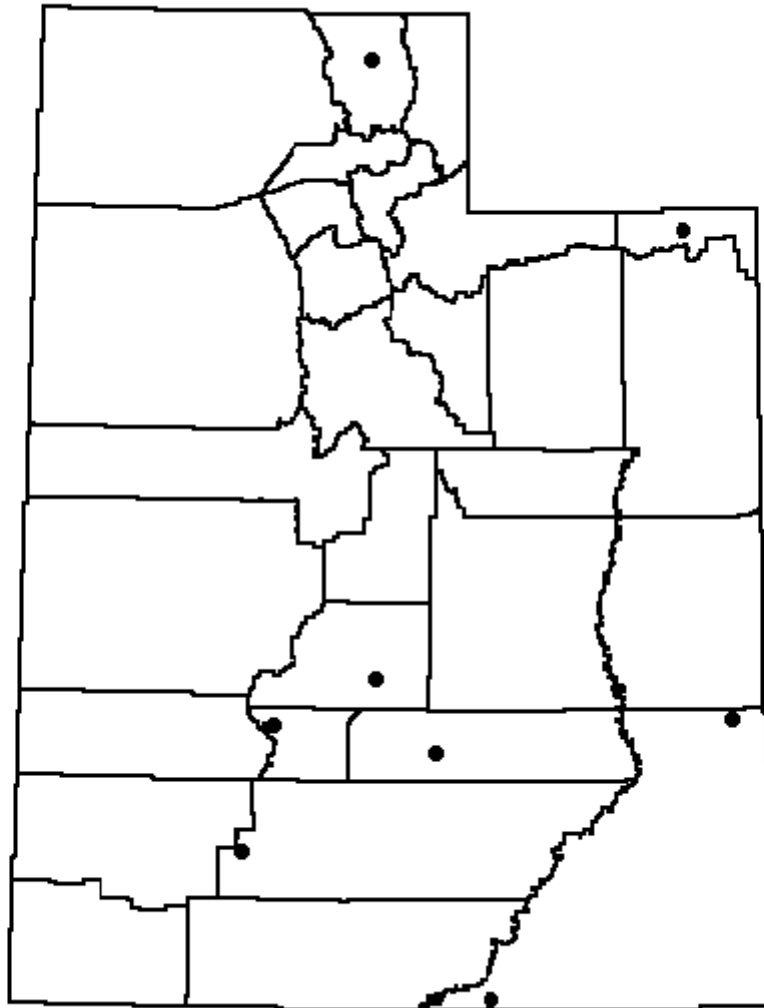


Figure 63. Utah localities for the striate disc (*Discus shimekii*) obtained from literature.

***Oreohelix howardi* Jones, 1944**
Mill Creek mountainsnail

Utah Taxonomy

Some authors (e.g., Clarke 1993) believe that the taxon *howardi* is simply a morphological variant of the widespread species *Oreohelix strigosa*. *Oreohelix howardi* is, however, currently recognized as a valid species by the American Fisheries Society (Turgeon et al. 1988, 1998).

No subspecies are recognized in this species.

Status in Utah

This is a narrow endemic, found only in Mill Creek Canyon, Salt Lake County. Currently 3 occurrences are known, one in each of two forks of Mill Creek Canyon and one in the main stem of the canyon. Because the current distribution of this species in the canyon is not completely understood, whether the occurrences should be considered one large colony or split into many smaller colonies cannot yet be determined.

Jones (1944) called this species "the common *Oreohelix* found in Mill Creek Canyon and its branches." Clarke (1993) reported: "This is a vigorous and healthy population and it appears to be very secure."

The increasing recreational use of Mill Creek Canyon, a narrow canyon on the very edge of the Salt Lake City metropolitan area, may lead to degradation of this snail's habitat. Forest fire in this canyon, if severe, could extirpate this species.

No declines in this species since its original description in 1944 are apparent. However, continued monitoring of this population is warranted in view of the human use Mill Creek Canyon.

Investigation of the taxonomic status and validity of this species is necessary.

Habitats Utilized in Utah

Clarke (1993) found this species only on north-facing slopes, within "moist coniferous forests".

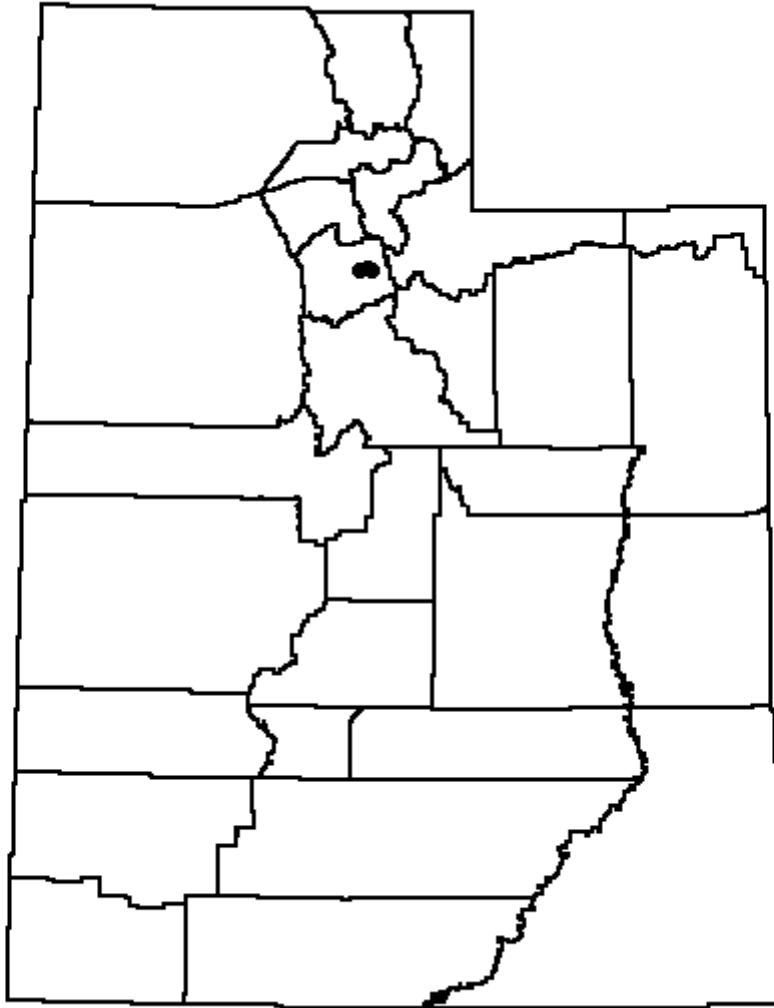


Figure 64. Utah localities for the Mill Creek mountainsnail (*Oreohelix howardi*) obtained from literature.

***Oreohelix peripherica* (Ancey, 1881)**

Deseret mountainsnail

Utah Taxonomy

When first discovered, this species was included within *Patula cooperi*. Later, *peripherica* was arranged as a subspecies of *Helix* (= *Oreohelix*) *idahoensis*, a species now considered to occur only in northern Idaho. Binney (1886) included the named morphological variants of this species as "varieties" of *Patula strigosa* (= *Oreohelix strigosa*). Henderson and Daniels (1916) and Pilsbry (1916a) recognized *peripherica* as a full species, an arrangement that has been followed by subsequent authors.

Previous to the work of Pilsbry (1916a) the names *multicostata*, *binneyi*, *gouldi*, *albofasciata*, and *castanea* were used variously as "varieties" (see, for example, Binney 1886) and "forms" (see, for example, Henderson and Daniels 1916, 1917) and sometimes were used as if they were subspecies (see, for example, Henderson and Daniels' [1916] use of *gouldi*). Pilsbry (1916a) listed *binneyi*, *albofasciata*, *gouldi* and *castanea* as named color forms of the type race, *peripherica*, and listed *newcombi* and *wasatchensis* as subspecies. The subspecies *weberiana* was described by Pilsbry (1939). Clarke and Hovingh (1994) suggested that *newcombi* and *weberiana* do not deserve subspecific status and are synonyms of the type race, *peripherica*.

Status in Utah

Approximately 13 colonies are known from Utah. Three of these colonies have been considered distinct subspecies and have been relocated in recent years. The remaining localities have not been revisited and their current status is not known. Populations are known in portions of Box Elder, Cache, and Weber counties (Henderson and Daniels 1916, 1917; Chamberlin and Jones 1929).

Henderson and Daniels (1916, 1917) reported several colonies of the subspecies *peripherica* as "abundant". Clarke and Hovingh (1994) estimated one colony (subspecies *weberiana*) to contain 20,000 individuals. Another colony (subspecies *wasatchensis*) was said to comprise between 10,000 and 100,000 individuals (Clarke 1993).

Threats to this species are unknown but are thought to include habitat loss from development and grazing and catastrophic events such as fires that could

potentially extirpate local populations. Populations that have been revisited in recent years by Clarke and Hovingh (1994) appear to be stable.

Most of the historical localities have not been revisited and their status is unknown. Inventory is needed to relocate and evaluate the extent of these colonies.

Habitats Utilized in Utah

Henderson and Daniels (1916, 1917) found this species under vegetation and associated leaf litter, specifically mentioning mountain maple (*Acer* sp.), scrub oak (*Quercus gambelii*), balsam root (*Balsamorhiza* sp.), and "a decumbent species of polygonaceous plant which clings closely to the rock."

At several localities reported by Henderson and Daniels (1916, 1917), *Oreohelix peripherica* was closely associated with limestone outcrops. The type locality (and only locality) of the subspecies *wasatchensis*, however, is a quartzite boulder field. Clarke (1993) found *wasatchensis* primarily in a maple grove adjacent to this quartzite boulder field, though a few live specimens were found among the boulders.

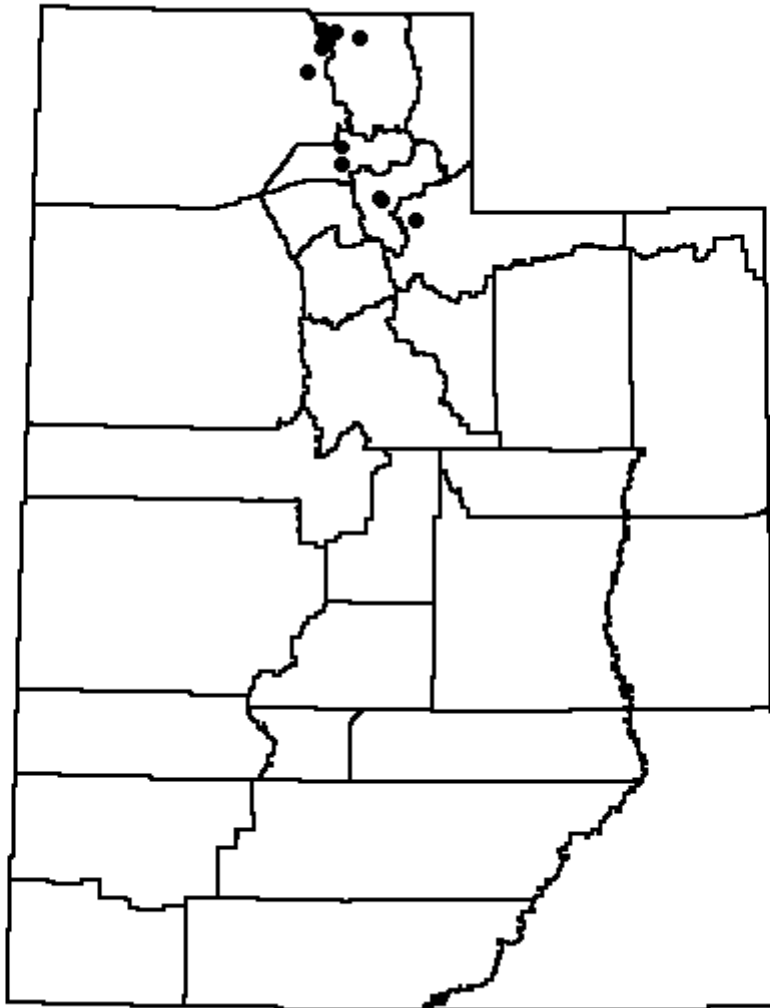


Figure 65. Utah localities for the Desert mountainsnail (*Oreohelix peripheralis*) obtained from literature.

***Oreohelix haydeni* (Gabb, 1869)**

lyrate mountainsnail

Utah Taxonomy

Binney (1886) treated all morphological variants of this species (along with several other currently recognized species) as "varieties" of *Patula strigosa* (= *Oreohelix strigosa*).

In the early literature *oquirrhensis*, *gabbiana*, *utahensis*, *hybrida*, and *hemphilli* were recognized as subspecies of *Oreohelix haydeni* under an antiquated concept of subspecific taxonomy. Later authors (e.g., Henderson and Daniels 1916, 1917) suggested that these were merely named color forms.

Chamberlin and Jones (1929) referred to a subspecies *wasatchensis*. Apparently this was an error, because *wasatchensis* was never proposed as a subspecies of *Oreohelix haydeni* but is recognized as a subspecies of the related *Oreohelix peripherica*; the context in which this apparent error occurs suggests that an inadvertent substitution was made, replacing the intended name *oquirrhensis* with *wasatchensis*.

Pilsbry (1939) retained three taxa as valid subspecies occurring in Utah: *haydeni*, *oquirrhensis*, and *corrugata*.

Status in Utah

Approximately 21 colonies have been reported in Utah. Determination of whether some clustered localities are, as Henderson and Daniels (1917) thought, separate colonies or are large continuous colonies will require new field work.

The distribution of this species in Utah is somewhat patchy and scattered through Cache, Rich, Weber, Morgan, Salt Lake, and Tooele counties.

One seemingly anomalous report is available from Washington County, which prompted Vanatta (1921) to predict statewide occurrence of this species, specifically the subspecies *oquirrhensis*. Woodbury (1929) and Gregg (1940) considered this record to be erroneous.

At 5 localities described by Henderson and Daniels (1917), the terms "plentiful" or "common" were used to describe populations. Several colonies were reported

to be declining (Henderson and Daniels 1917), and no recent efforts have been made to verify their continued existence.

Clarke (1993) conducted surveys at the type locality for the type race, *haydeni*, and also at the type locality for the race *corrugata*. At the former locality, he estimated a population of 1 million snails within the 60-acre colony despite the fact that only 10 live snails were recorded on his field sheets. He did not explain how he derived this estimate. At the type locality for *corrugata*, the population was estimated to contain between 1 million and 10 million snails. Again, Clarke did not explain how this population estimate was calculated; only 6 live snails were recorded on field sheets after searching 100 acres.

As early as 1915, Henderson and Daniels (1916) noted habitat degradation at several of their localities. Describing the poor conditions near Garden City, Henderson and Daniels (1917) stated: "[t]he slopes are now very barren, but we were informed by pioneers that forty-five years ago they were well covered with large mountain mahogany, up to a foot in diameter[.] ... [W]asteful cutting and fires have denuded the hills for some miles back, and overgrazing by stock has been disastrous to the smaller shrubs and herbs."

Near the type locality of *Oreohelix haydeni haydeni*, Henderson and Daniels (1917) commented that "[t]he vicinity is covered by a thick coat of lime dust from the cement plant. It is strange that any live examples were found under the circumstances." Clarke (1993), who investigated the same area 76 years later, listed grazing and "expansion of quarry activities" as a threats to the colony. Declining habitat quality could have taken a toll in the intervening years, however, because Clarke (1993) apparently did not find the species *haydeni* to be as common in this portion of Weber Canyon as Henderson and Daniels (1917) had.

Natural catastrophic events can also affect colonies. At least one colony appeared to have been extirpated by fires in years immediately preceding surveys by Henderson and Daniels (1916, 1917). Drought can exacerbate anthropogenic effects, increasing erosion (see Henderson and Daniels 1917) and also influence the frequency and intensity of fires.

Clarke (1993) did not note evidence of declines in either of the two colonies that he visited. Henderson and Daniels (1916, 1917), however, described severe habitat degradation at several of the localities visited. Noting the combined effects of deforestation, fire, and overgrazing at a locality near Bear Lake, Henderson and Daniels (1917) stated that "[e]rosion is rapidly carrying the soil and vegetative debris from beneath the scant shrubbery and may soon destroy the colony, unless saved by a series of years of increased moisture" A colony near Logan was

said to be "likely near extinction" from the effects of overgrazing and subsequent erosion (Henderson and Daniels 1917).

Most known localities have not been revisited since 1916. Field work is necessary to determine the current status of colonies throughout the range of *Oreohelix haydeni*.

Habitats Utilized in Utah

Henderson and Daniels (1916), referring to the genus *Oreohelix* in general, state: "Limestone is common at almost every locality visited, this being a favorable condition for *Oreohelix*. The edges of coarse, angular limestone talus protected from rapid evaporation by overhanging bushes, formed the cover for some of the finest colonies we have seen, the snails occupying crevices among the rocks." Indeed, the majority of their localities for *Oreohelix haydeni* fit this description. The few localities where exposed limestone was not present were presumed to have calcareous soils.

Common vegetative cover for this species included balsam root (*Balsamorhiza* sp.), bitterbrush (*Purshia tridentata*), mountain maple (*Acer* sp.), sagebrush (*Artemisia tridentata*), and wild cherry (*Prunus* sp.) (Henderson and Daniels 1916, 1917).

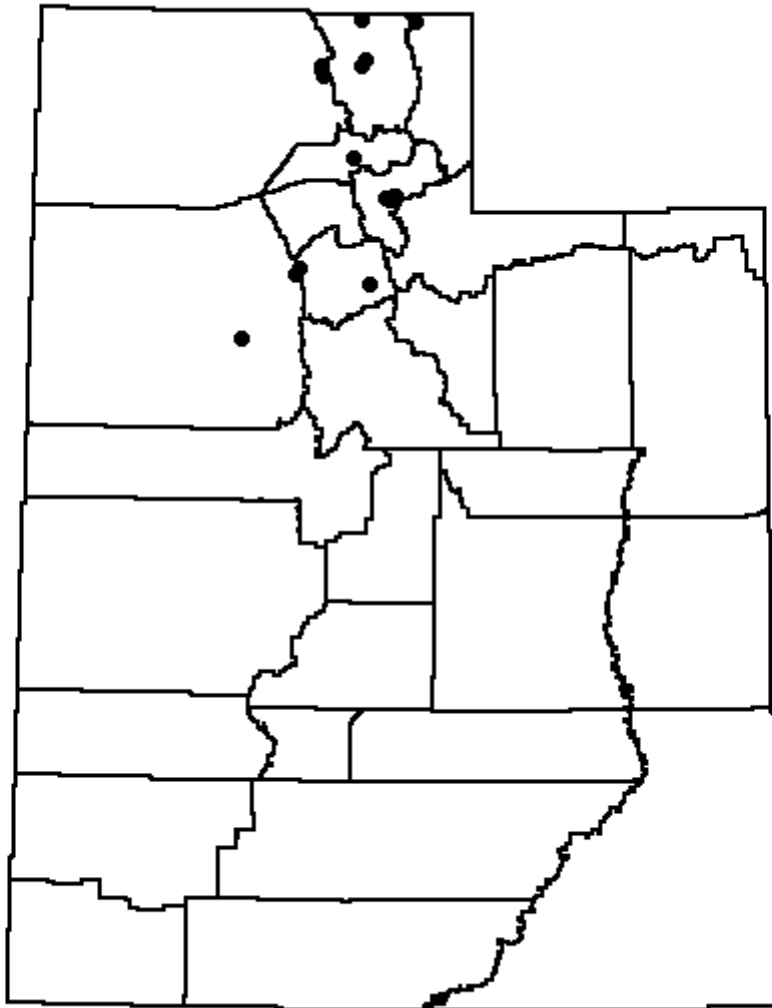


Figure 66. Utah localities for the lyrate mountainsnail (*Oreohelix haydeni*) obtained from literature.

***Oreohelix yavapai* Pilsbry, 1905**

Yavapai mountainsnail

Utah Taxonomy

Ferriss (1920) reported the subspecies *neomexicana* and *cummingsi* from his Utah collecting localities, but Pilsbry (1933) referred Ferriss' specimens of *neomexicana* to *cummingsi*. Thus, following Pilsbry's arrangement, only *Oreohelix yavapai cummingsi* occurs in Utah.

Status in Utah

In Utah this species is known from two localities, but it has not been detected in the state since the original discoveries in 1919 by Ferriss (1920).

This species has been reported only from 2 localities in Utah, one on Navajo Mountain and one in the Abajo Mountains near Monticello, both in San Juan County. Clarke and Hovingh (1994) discussed specimens "near Taggerts, Morgan County, in Weber Canyon" that "closely resemble *O. yavapai*" They added, though, that "[s]imilar specimens from that area have been identified as *O. haydeni oquirrhensis* form *gabbiana* (Hemphill) by Henderson & Daniels (1917)."

Ferriss (1920) found this species to be "abundant" at one locality near Monticello, but neither this population nor the Navajo Mountain population, for which Ferriss (1920) provided no indication of population size, have been relocated since Ferriss' initial discovery. Clarke and Hovingh (1994) searched for this species at the two Utah locations where Ferriss (1920) had reported it—on Navajo Mountain and in the Abajo Mountains near Monticello—and were unable to find any evidence of it; they concluded "that *O. y. cummingsi* ... may ... be uncommon or rare in both areas."

Clarke and Hovingh (1994) described heavy human disturbance and alterations to the environment on and around Navajo Mountain. Whether grazing and human activities have resulted in the extirpation of this population is not known; Clarke and Hovingh (1994) concluded, however, that "[a]lthough sheep grazing on Navajo Mountain and possible forest fires in both areas [i.e., Navajo Mountain and the Abajo Mountains near Monticello] could impact the subspecies [*cummingsi*], there appear to be no current threats to its existence."

This species was found only in 1919 (Ferriss 1920) at each of its two known Utah localities. The failure of Clarke and Hovingh (1994) to detect it at Ferriss' 2 Utah

locations, however, is not sufficient to indicate its disappearance or decline in Utah, and no population trend for the species in Utah can be inferred.

Renewed efforts are needed to relocate the historical populations of *Oreohelix yavapai* in Utah which have not been seen since 1919.

Habitats Utilized in Utah

Navajo Mountain, according to Ferriss (1920), is primarily composed of sandstone, in some places heavily eroded into complex structure—"[m]any fairy bowers, coves and valleys" using Ferriss' terminology. On this mountain Ferriss (1920) reported finding this species, though not alive, "[a]mong the rocks of a large canyon" and also mentioned finding it "in the rock slides."

In the Abajo Mountains, Ferriss (1920) found this species "in the shale and also scattered among the rock slides and the aspens" in a setting of "peaks ... covered by thick groves of aspen and spruce with large open spaces of coarse grass and slides of sandstone fringed with wild currants and raspberries."

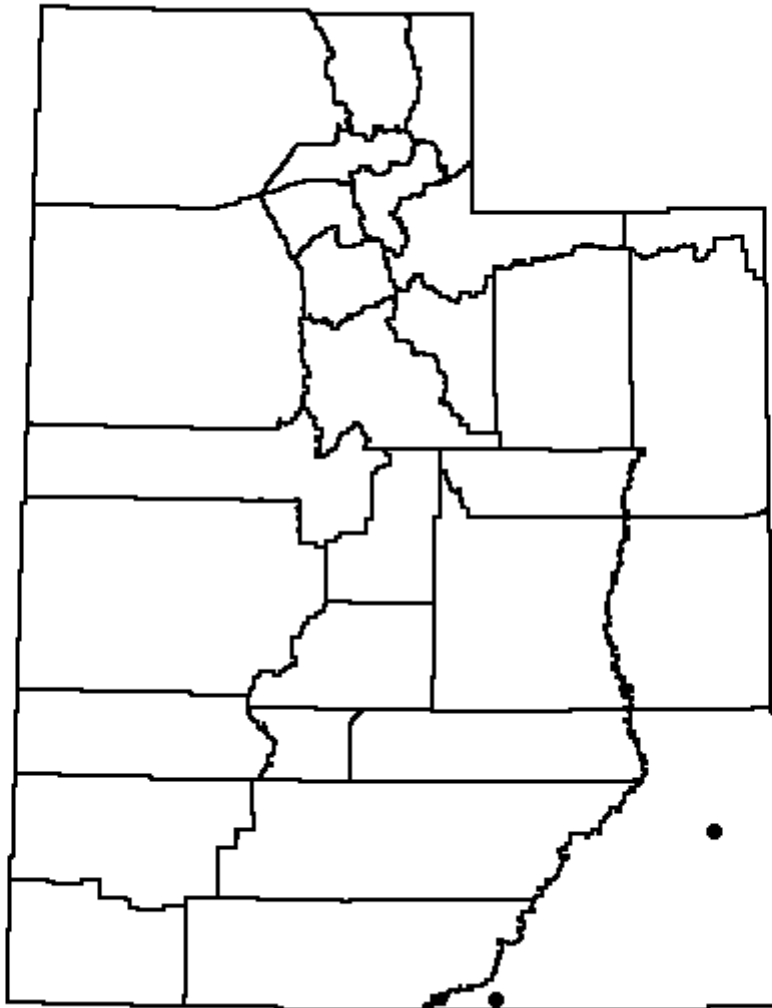


Figure 67. Utah localities for the Yavapai mountainsnail (*Oreohelix yavapai*) obtained from literature.

***Oreohelix eurekaensis* J. Henderson and Daniels, 1916**

Eureka mountainsnail

Utah Taxonomy

This taxon was originally described as *Oreohelix hemphilli eurekaensis* by Henderson and Daniels (1916); it was subsequently elevated to full specific status as *Oreohelix eurekaensis* by Henderson (1924).

Two races of *Oreohelix eurekaensis* are recognized, *Oreohelix eurekaensis eurekaensis*, the type race described by Henderson and Daniels (1916), and *Oreohelix eurekaensis uinta*, a race proposed by Brooks (1939). The latter taxon was treated as a full species by Turgeon et al. (1988), but, "[i]n the absence of a published justification for that taxonomic change", Turgeon et al. (1998) returned *uinta* to subspecific status. Roscoe (in Roscoe and Grosscup 1964) expressed "grave doubts as to the validity" of *uinta*, even as a subspecies.

Status in Utah

Endemic to Utah, this species has been reported from about 6 localities representing 4 widely separated populations scattered across northern Utah roughly in an east-west band. These 4 populations are in the northern part of the East Tintic Mountains (Mammoth Peak, Godiva Mountain, and Lime Peak), on the Juab–Tooele county line (Henderson and Daniels 1916, 1917, Clarke 1993, Clarke and Hovingh 1994); on Hominy Creek on the south slope of the Uinta Mountains, near the Duchesne–Uintah county line (Brooks 1939, Oliver and Bosworth submitted); in the Deep Creek Mountains, near the Juab–Tooele county line and the Utah–Nevada boundary (Roscoe 1954); and on the East Tavaputs Plateau, Grand County (Roscoe and Grosscup 1964).

In the original report of this taxon, Henderson and Daniels (1916) wrote that they found "7 specimens, all dead shells," at the type locality in 1915. However, when they revisited this site in 1916 (Henderson and Daniels 1917), they found "about 600 [*Oreohelix eurekaensis*], mostly alive." A recent estimate of the population of this species at the type locality and vicinity was 50,000 to 500,000 individuals on Mammoth Peak and Godiva Mountain, with perhaps a very small population on Lime Peak (Clarke 1993, Clarke and Hovingh 1994); this estimate was based on the finding of a combined total, from the three mentioned localities, of only 48 dead shells and 3 live individuals and appears to be a gross overestimate. It seems much more reasonable to conclude, from the recent finding of a total of only 48 dead shells--some (perhaps many) of them old—and 3 live individuals (all on Godiva

Mountain), that the actual total population of this species in the vicinity of the type locality is less (perhaps much less) than one-tenth the number(s) estimated by Clarke. It is indeed difficult to envision the formula used to arrive at an estimated living population of 50,000 to 500,000 from a field census that revealed only 3 living individuals. New information concerning the population of *Oreohelix eurekaensis uinta* is forthcoming (Oliver and Bosworth submitted).

The principal threat to this species at the type locality is mining activities. Clarke (1993) pointed out that "[t]he whole area [inhabited by this species] is covered by patented mining claims controlled by the Kennicott [*sic*] Copper Company." He noted as well that "Godiva [*sic*] Mountain has several abandoned mines on it and these, or others, could be activated if proper economic conditions develop", and "[m]ining operations, now abandoned, have reduced the available habitat for this species". On the field sheet for Godiva Mountain, he reported: "Area to **b** way up mountain has been seriously disturbed by mining activities (slag heaps, trash piles, areas flattened by vehicles, 2 excavations)...." Clarke also considered fire to be a potential threat to this species. Oliver and Bosworth (submitted) discuss threats to the race *Oreohelix eurekaensis uinta*.

Clarke and Hovingh (1994) stated: "Although we did not find the large population of this species seen on Godiva Mountain by Henderson & Daniels (1917), our findings there are quite similar to their earlier findings (Henderson & Daniels, 1916). Our work also materially extended the known range of the species [to Mammoth Peak and Lime Peak]. We therefore believe that no general population decline has occurred." This statement must be viewed skeptically: Only on Godiva Mountain, Henderson and Daniels' type locality, did Clarke and his co-workers find any living individuals of this species—and there only 3. In the 2 areas that "materially extended the known range of the species", Mammoth Peak and Lime Peak, they found only dead shells. In fact, on Mammoth Peak, while searching for *Oreohelix eurekaensis* but finding only dead shells, they found 23 living snails of a related species, *Oreohelix strigosa*, which shows that both the sampling techniques that were used and the climatic conditions at the time were appropriate for finding living snails of the genus *Oreohelix*. Moreover, on Lime Peak their search yielded only "1 old shell", and it should be recognized that old shells often are very old—hundreds, if not thousands, of years old. Thus, while it is clear that this species has inhabited Mammoth Peak and (probably) Lime Peak at some time in the past, there is no convincing evidence that an extant population of this species is present at either of these sites that "materially [extend] the known range of the species." Thus, Clarke and Hovingh's (1994) failure to find the large population of this species discovered earlier in this century on Godiva Mountain, where they found only 3 living individuals, should be considered, at least until a more thorough inventory for this species is conducted, as evidence of a population decline—perhaps a very serious one.

Inventory is needed to resolve questions regarding the health and extent of the Godiva Mountain population as well as to establish whether these snails survive on Mammoth Peak, where only dead shells have been discovered thus far, and similarly to determine whether the species is present on Lime Peak, from which only 1 old shell is known. Although Clarke (1993) surveyed additional sites in the East Tintic Mountains without finding this species, further prospective searches should be conducted.

It is also possible that this species could be detected elsewhere in northern Utah, an opinion expressed strongly by Roscoe and Grosscup (1964), who wrote: "The species [*Oreohelix eurekensis*] is undoubtedly widely distributed over both the Bonneville and Colorado drainages in favorable situations."

Habitats Utilized in Utah

Henderson and Daniels (1916), in the type description, mentioned that this snail was found "associated with *O[reohelix] cooperi* [= *Oreohelix strigosa*]" "on north side of Godiva Mountain, ... on a slope of Paleozoic limestone, under shrubs and other vegetation ... [and] angular blocks of limestone, no good rock slides exposed." Clarke (1993), discussing this same locality and population of *Oreohelix eurekensis*, reported that the species is "[f]ound under pygmy sagebrush and at the bases of ledges on north-facing slopes at altitudes of about 2200 to 2400 meters."

Roscoe (1954) reported this species "at base of cliff, south side of canyon bottom, ... [i]n Aspen, Douglas Fir forest, el. ca. 7500 feet."

Roscoe and Grosscup (1964) found this species at elevations of "about 8025 feet" and "about 8000 feet" "at the base and trunk of aspen trees" and "on dead leaves at the base and trunk of aspen". They (Roscoe and Grosscup 1964) noted: "All of the rock exposures in the area are of a yellowish sandstone, presumably part of the Eocene Green River formation." At the 2 sites where they found *Oreohelix eurekensis*, "the forest cover includes aspen, spruce, pine, and fir [while] [t]he valley floors and other open areas are grassy, with interspersed stands of sagebrush [and] [j]uniper and scrub oak occur sparingly."

Information concerning the habitat of *Oreohelix eurekensis uinta* is being reported by Oliver and Bosworth (submitted).

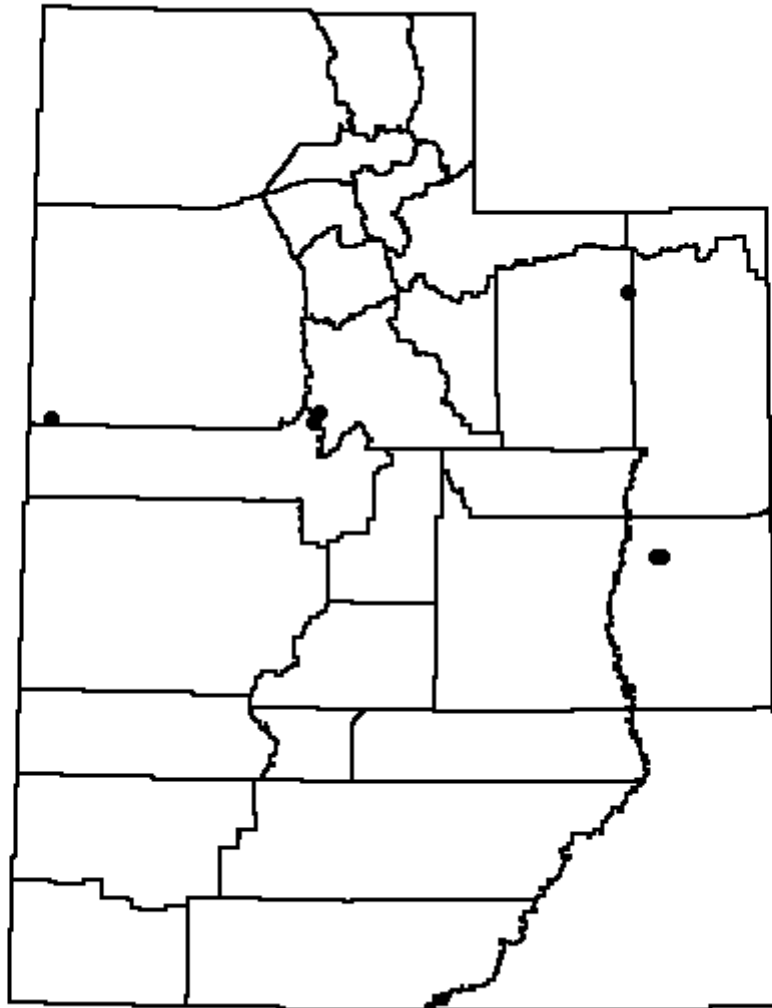


Figure 68. Utah localities for the Eureka mountainsnail (*Oreohelix eurekaensis*) obtained from literature.

***Oreohelix parawanensis* Gregg, 1941**
Brian Head mountainsnail

Utah Taxonomy

The specific epithet appears to be a misspelling of Parowan, the name of the mountains in which this species was discovered. Clarke and Hovingh (1994) "emended" the name and used the spelling *parowanensis*; however, this was an unjustified emendation, in violation of international nomenclatural rules, as explained by Oliver and Bosworth (submitted).

No subspecies have been proposed in this species.

Status in Utah

This species is known only from near the summit of Brian Head Peak in Iron County, to which locality it is strictly endemic. Local distribution on Brian Head is being reported by Oliver and Bosworth (submitted).

Gregg (1941a) collected 31 empty (dead) shells, and Clarke (1993) and Clarke and Hovingh (1994) reported that they found 1 dead shell. Data on abundance and status of this species is being reported by Oliver and Bosworth (submitted).

This species occurs as a single, localized population, and, as such, it is susceptible to catastrophic events. Development is also a threat in this area because a ski resort is located in the immediate vicinity. Potential threats to this species are discussed by Oliver and Bosworth (submitted). Population trends are unknown. Current status of the species is being reported (Oliver and Bosworth submitted).

Although searches for this species elsewhere in the Parowan Mountains near Brian Head (Clarke 1993) and a malacological study of Cedar Breaks National Monument, adjacent to Brian Head, by the discoverer of this species (Gregg 1941a) have not revealed its presence, it is possible that the species could yet be found somewhere in the vicinity of Brian Head. Even negative results would be of value, for such results would strengthen understanding that this organism is as geographically limited as it appears to be.

Habitats Utilized in Utah

The only locality known for this species is a rock slide on the southwest slope of

a mountain; the site is above timber line at an elevation of approximately 11,000 ft (Gregg 1941a). Detailed habitat information is being reported by Oliver and Bosworth (submitted).

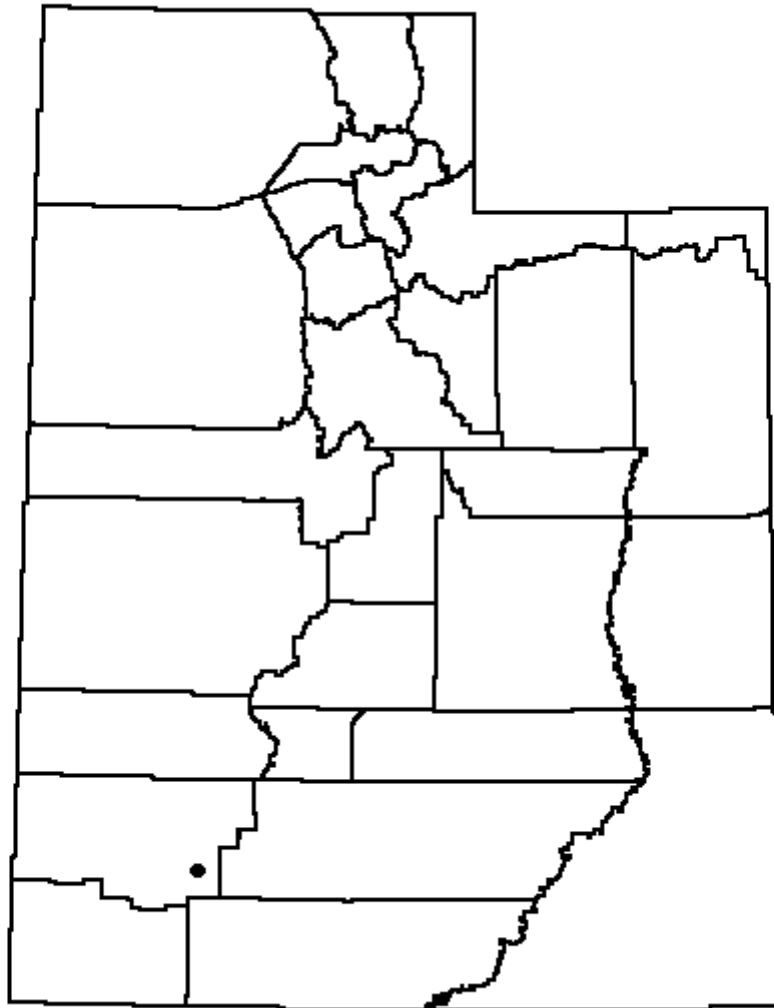


Figure 69. The Utah locality for the Brian Head mountainsnail (*Oreohelix parawanensis*) obtained from literature.

***Oxyloma kanabense* Pilsbry, 1948**

Kanab ambersnail

Utah Taxonomy

Ferriss (1910) was the first to collect this gastropod, in Utah in 1909, which he identified as *Succinea hawkinsi*; Pilsbry (1948), however, noted: "This form was referred to *S. hawkinsi*, with some doubt, at the time it was found" Chamberlin and Jones (1929) also included this population within *Succinea hawkinsi*, which they called Hawkins' swamp snail. (It should be noted that Chamberlin and Jones [1929] did include in the Utah fauna what they called *Succinea haydeni*, Hayden's swamp snail, for which they listed about 15 Utah localities extending in a band from Sevier County north through Sanpete, Utah, Salt Lake, and Weber counties to Cache and Rich counties.)

Pilsbry (1948) described the population discovered by Ferriss (1910) as a new subspecies, *Oxyloma haydeni kanabensis*. Clarke (1991) stated: "It [*Oxyloma haydeni kanabensis*] may deserve specific status." Spamer and Bogan (1993) reconsidered the taxon morphologically and suggested that it deserves specific rank. Wu (in England 1995) also has suggested that the taxon merits full specific status. Turgeon et al. (1988, 1998) and Groombridge (1993) have listed this taxon as a full species, *Oxyloma kanabense*.

Pilsbry (1948) designated the type locality as "'The Greens,' six miles above [i.e., north of] Kanab, on Kanab Wash", Kane County, Utah, where J. H. Ferriss collected the type and paratypes (no. 103166 in the collection of the Academy of Natural Sciences of Philadelphia) in 1909.

Recently Miller et al. (1997), using genetic techniques, have compared populations assigned to *Oxyloma haydeni kanabensis* from Three Lakes (Utah) and Vasey's Paradise (Arizona) with other populations assigned to *Oxyloma haydeni haydeni* from 2 localities in northern Arizona, Indian Gardens and -9 Mile Spring. They found that the Three Lakes population is closely related to the Indian Gardens population and recommended that the Indian Gardens population be removed from *Oxyloma haydeni haydeni* and assigned to the subspecies *Oxyloma haydeni kanabensis*. These authors noted the need for further work, particularly work using mt-DNA sequence data, and they also considered the suggestions of others that *kanabensis* may deserve full species status.

Status in Utah

This taxon has been reported from 2 localities in Utah, both in extreme southern

Kane County (Clarke 1991, England 1995): the larger population, reported to be extant, is located at Three Lakes, about 10 km (6 mi) WNW of Kanab; a much smaller population, reported as seemingly extirpated, occurred in Kanab Creek Canyon, about 10 km (6 mi) N of Kanab. These 2 populations are about 2.1 km (1.3 mi) apart.

Clarke (1991) reported that considerably fewer than 85,000 individuals remain at the one Utah locality with an area much less than 2,000 acres (see Clarke 1991). At the only other reported Utah locality, which is much smaller, probably much less than 1 acre, Clarke found only 3 individuals in 1990 (Clarke 1991); England (1995) wrote that none has been found there since 1990, and the population has been presumed to be extirpated.

However, recent, on-going work by Vicky Meretsky (Indiana University) and co-workers (unpublished) has revealed a more extensive distribution and greater abundance of this taxon in the vicinity of Kanab than other recent reports (Clarke 1991, England 1995) had indicated, and they are investigating other parts of Kane County as well.

The main threats to this taxon in Utah are habitat loss through development (e.g., bulldozing for a trailer park) and habitat degradation (dewatering of the habitat through water diversion) as well as direct destruction of the snails through trampling by livestock (Clarke 1991).

The population trend of this taxon in Utah, based on available reports (Clarke 1991, England 1995) appears to be one of precipitous decline. In June 1990 the Three lakes population was estimated by Clarke (1991) to contain about 100,000 individuals, but later, in September of that year, the population was considered by Clarke (1991) to have been considerably reduced by trampling by livestock, seemingly having lost about 15,000 individuals, and early in 1991 Clarke noted further disturbance (bulldozing), which he speculated was devastating even more of the population (Clarke 1991). The smaller population reportedly may be extirpated; Clarke (1991) found only 3 individuals there in 1990, and "[n]o individuals have been collected or observed since 1990" (England 1995).

Inventory is needed to ascertain the status (current size and extent) of the Three Lakes population and to re-examine the belief that the Kanab Creek Canyon population no longer exists. Prospective searches should be made elsewhere in southern Utah, especially in southern Kane County (e.g., along tributaries to the Colorado River system, especially tributaries to Lake Powell). (Again, Vicky Meretsky and co-workers are currently conducting such investigations.)

Habitats Utilized in Utah

Pilsbry (1948), in the type description of this taxon, noted that it was found "on a wet ledge among rocks and cyprapediums." Clarke (1991) reported the habitat of the Three Lakes population as a marsh dominated by *Typha* in its wettest portion. Grasses, *Carex*, violets, plantains, and alders were also present. The densest snail aggregations were found under fallen *Typha* stalks, at the edges of thick *Typha* stands. The snails were also frequently observed just within the mouths of vole burrows. The presence of standing water appeared to be important to their local distribution. Clarke (1991) found that the habitat of the small population that existed along Kanab Creek also included *Mimulus guttatus*, *Dodocatheon pauciflorum*, *Aquilegia micrantha*, a tall grass species, and *Juncus*.

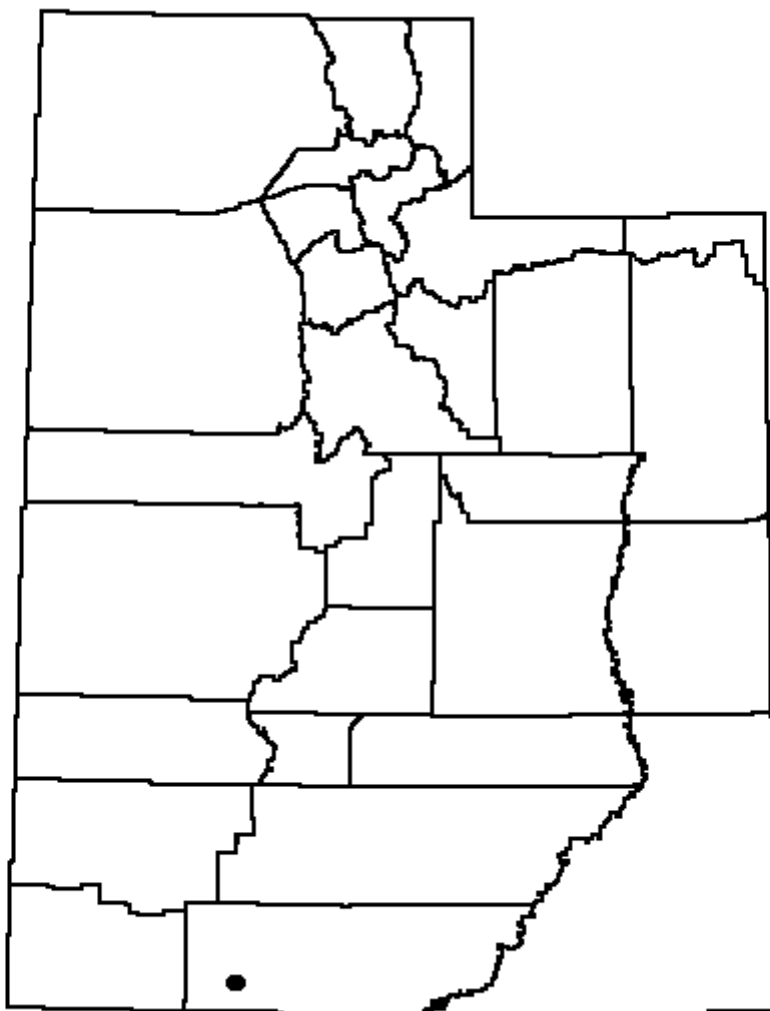


Figure 70. Utah localities for the Kanab ambersnail (*Oxyloma kanabense*) obtained from literature.

***Succinea grosvenori* I. Lea, 1864**
Santa Rita ambersnail

Utah Taxonomy

Apparently the subspecies that occurs in Utah is the type (or nominate) race, *Succinea grosvenori grosvenori*.

Status in Utah

This species has been reported historically from 7 localities, 4 in north-central Utah (Cache [probably], Salt Lake, Tooele, and Utah counties [Pilsbry 1948]) and three in southeastern Utah (San Juan and Grand counties [Chamberlin and Berry 1929, Chamberlin and Jones 1929]).

No information regarding abundance of this species in Utah has been reported.

Threats to this species in Utah are not known. Population trend of this species in Utah is not known.

Inventory is needed to determine whether this species is extant in the areas from which it has been reported historically in Utah and to determine the extent of its distribution in this state.

Habitats Utilized in Utah

No habitat information for this species in Utah is known. Pilsbry (1948), however, wrote: "*S. grosvenori*, as now understood, tolerates an astonishingly wide range in practically all external conditions. It occurs from the warm humid Gulf coast to semi-arid areas in the great plains and mountain states"

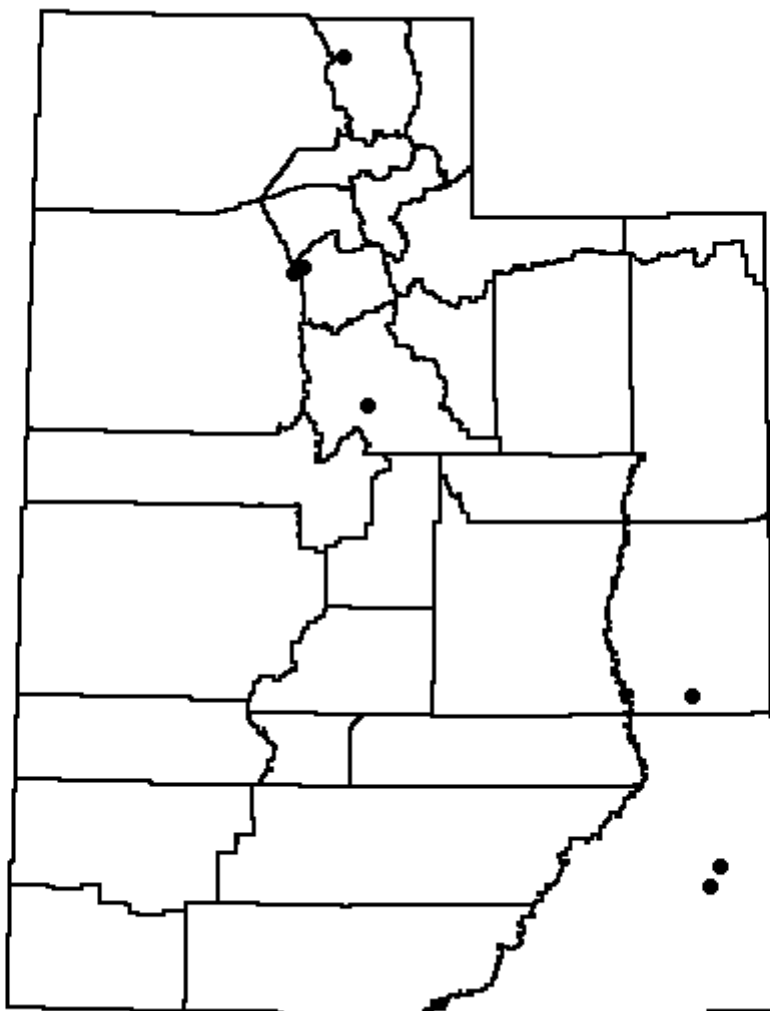


Figure 71. Utah localities for the Santa Rita ambersnail (*Succinea grosvenori*) obtained from literature.

***Succinea rusticana* Gould, 1846**
rustic ambersnail

Utah Taxonomy

It is doubtful that any infraspecific taxa are currently recognized within this species. (If subspecies were accepted in the species, Utah populations would likely be assignable to what would be the type, or nominate, race, *Succinea rusticana rusticana*.)

Status in Utah

This species has been reported historically from 3 localities in 3 counties in north-central Utah: one locality each in Cache County (Henderson and Daniels 1917, Chamberlin and Jones 1929), Morgan County (Henderson and Daniels 1917), and Salt Lake County (Woolstenhulme 1942a).

The only report of this species in Utah that mentions numbers of this species was that of Woolstenhulme (1942a), "3 specimens", and even this report does not indicate whether any of the 3 specimens were alive. Thus, abundance of this species in Utah is unknown.

Threats to this species in Utah are not known. However, since the species utilizes wet sites and may even be semi-aquatic, dewatering (e.g., through diversions of streams for irrigation and other purposes), alteration of aquatic habitats (e.g., damming of streams), and degradation of water quality (e.g., pollution) may be threats. Population trend of this species in Utah is unknown.

Inventory is needed in at least north-central Utah to determine whether this species is extant in areas of its reported historical occurrence as well as to assess its abundance and the extent of its distribution in the state.

Members of the family Succineidae are among the most difficult to identify of all mollusks, with even identification to genus being no simple matter. Thus, it is possible that this organism has been collected in Utah but not identified to species or that Utah specimens have been misidentified as other species that are more common.

Habitats Utilized in Utah

Henderson and Daniels (1917) are the only authors who have reported habitat information for this species in Utah. One of the two Utah sites where they collected the species they described as "a small stream choked with water-cress" and the other as "pools beside [a] railroad track". Although their report does not specify where in relation to the stream and the pools they found this species, it is quite possible that they found these snails not only at the water's edge but actually in (i.e., under) the water, many species in this genus being amphibious.

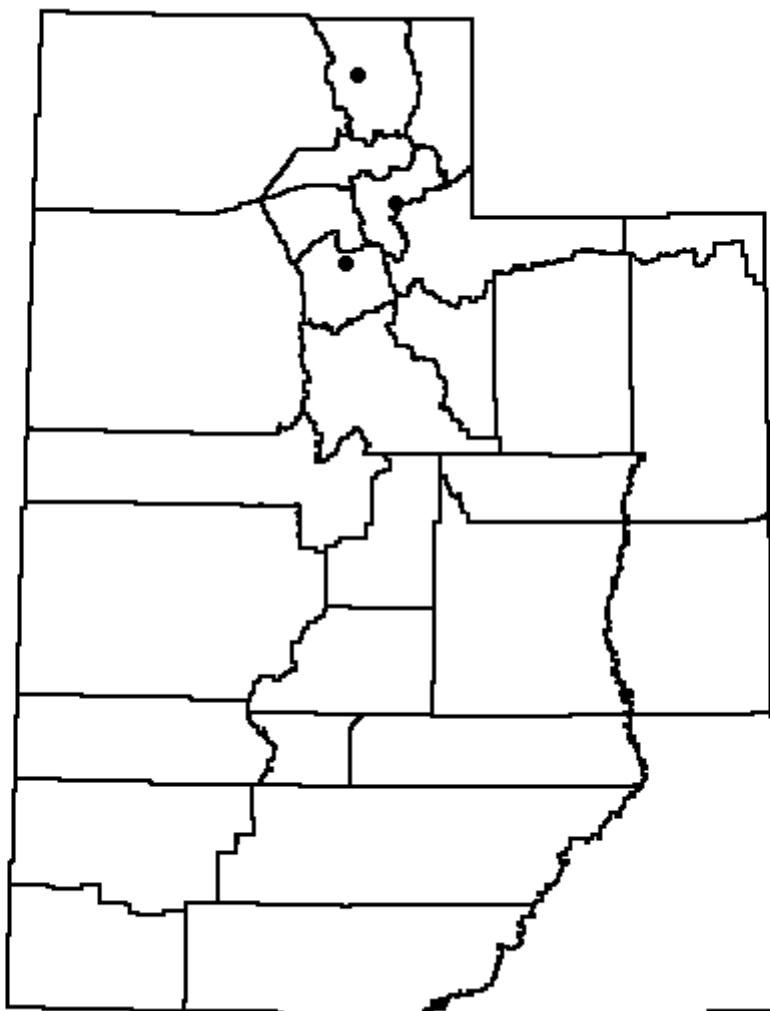


Figure 72. Utah localities for the rusted ambersnail (*Succinea rusticana*) obtained from literature.

***Catinella stretchiana* (Bland, 1865)**
Sierra ambersnail

Utah Taxonomy

Pilsbry (1948), in the work that presented the only report of this species in Utah, referred to it using the name *Succinea stretchiana* but commented: "*S. stretchiana* may be a [member of the genus] *Quickella*." North American species formerly referred to *Quickella* are now assigned to the genus *Catinella*. It should be noted that the Succineidae, to which this species belongs, is one of the least well understood, systematically and taxonomically, of molluscan families.

Apparently no infraspecific taxa (subspecies) are recognized within this species.

Status in Utah

The single reported locality for this species in Utah is "near Brigham City" (Pilsbry 1948), almost certainly in Box Elder County. No information regarding the abundance of this species in Utah is known.

Threats to this species in Utah are not known, but, since the species has aquatic affinities, alteration and degradation of aquatic habitat likely are threats, especially in the area of its one Utah occurrence, which is experiencing urban expansion as well as agricultural development. Population trend of this species in Utah also is not known; it has not been reported in the state since 1948 (Pilsbry 1948), but the collection date is not known, and it may have been much earlier.

Inventory is needed in extreme eastern Box Elder County to determine whether this species is extant in the area where it was historically collected in Utah as well as in other parts of northern Utah where it may occur.

This, like other members of the family Succineidae, is difficult to recognize, and thus it may have been misidentified or overlooked in collections of gastropods from Utah.

Habitats Utilized in Utah

The single report of this species in Utah (Pilsbry 1948) gave the elevation of the collecting site as 4,500 ft and noted that it was "on low marshy land".

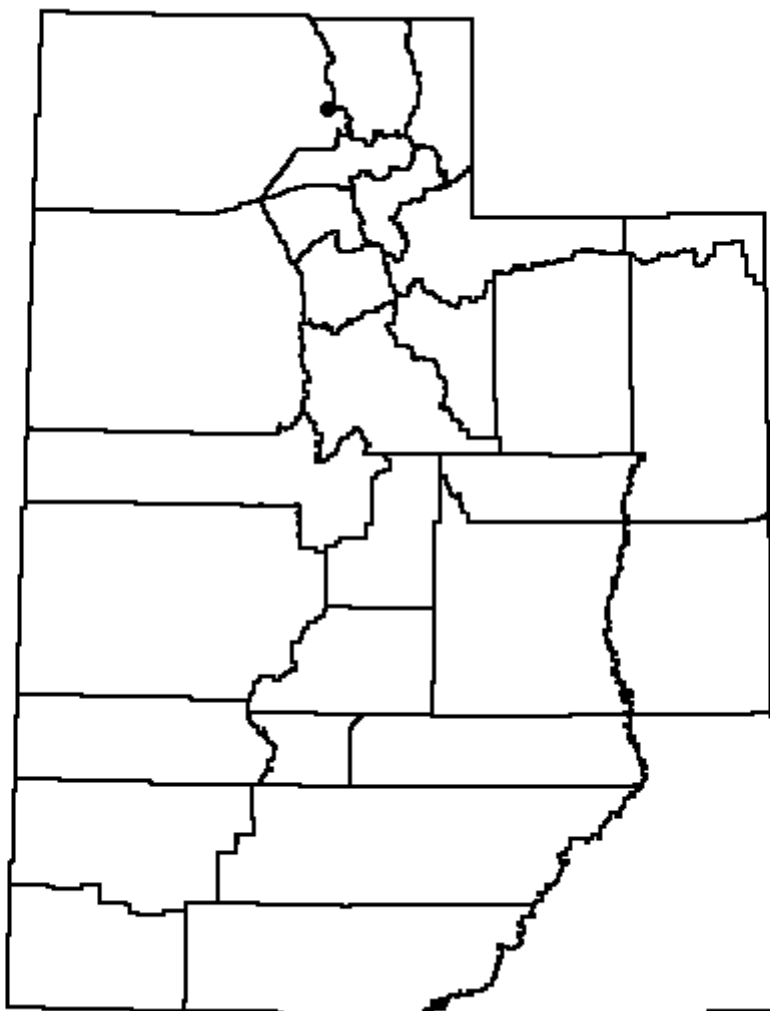


Figure 73. The Utah locality for the Sierra ambersnail (*Catinella stretchiana*) obtained from literature.

***Nesovitrea electrina* (Gould, 1841)**
amber glass

Utah Taxonomy

All authors who have mentioned this species in Utah (Brooks 1936; Gregg 1941b, 1942; Pilsbry 1946; Chamberlin and Roscoe 1948) have referred to it as *Retinella electrina*, as it was formerly called.

No subspecies are recognized in this species.

Status in Utah

This species has been reported from 5 localities in at least 4 Utah counties in the southwestern, northeastern, and north-central parts of the state: Iron County (Gregg 1941b, Gregg 1942), Washington County (Gregg 1942), Uintah County (Brooks 1936), and Weber County (Baker 1930, Pilsbry 1946).

The only information having to do with abundance of this species in Utah comes from Baker (1930), who reported 1 juvenile specimen apparently somewhat uncertainly identified, from Brooks (1936), who reported 2 specimens, and from Gregg (1942), who reported 4 specimens from 1 locality and 1 from a second locality. This suggests that the species is rare in the state.

Although threats to this species in Utah are not known, it is believed that this species, though vulnerable due to its rarity, is not very threatened in this state. Population trend in this species in Utah is unknown; possibly it is stable.

Inventory is needed in mesic situations, especially riparian and higher elevation sites, throughout the state to determine extent of distribution and abundance of this species in Utah. The fact that it was missed by many earlier malacological workers in Utah (see, for example, Chamberlin and Jones 1929) and was not discovered in the state until 1935 (Brooks 1936) is indicative of the difficulty of finding it in this state.

Habitats Utilized in Utah

The only report of this species in Utah that has provided habitat information is that of Gregg (1941b), who described the area where he collected it as "lofty forests of Engelmann spruce and alpine fir" and further wrote: "Here the altitude was

10,000 feet. There was a moderate amount of moisture most of the time and but a few yards away a series of springs in a swampy meadow formed brooklets" However, based on consideration of the localities of other Utah records of the species (i.e., Brooks 1936, Gregg 1942, Pilsbry 1946), it is apparent that various other habitats are utilized by the species in this state.

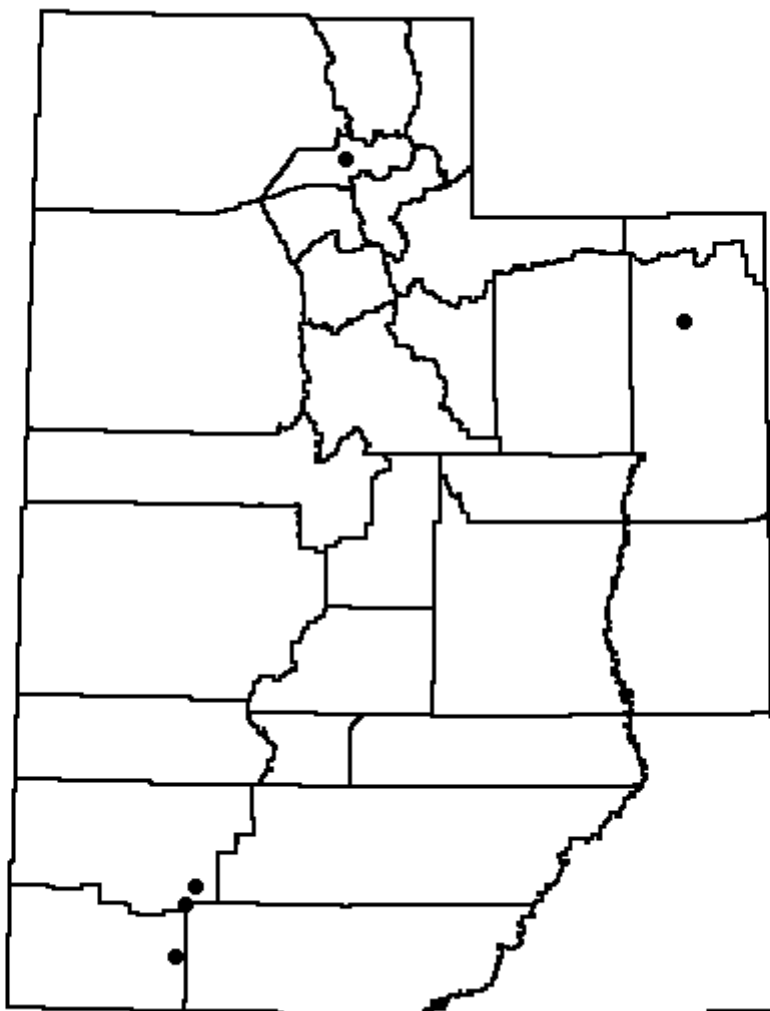


Figure 74. Utah localities for the amber glass (*Nesovitreia electrina*) obtained from literature.

***Glyphyalinia umbilicata* (Cockerell, 1893)**

Texas glyph

Utah Taxonomy

Formerly, the taxon *umbilicata* was arranged as a subspecies of *indentata*, reported first in the genus *Vitrea* and later in the genus *Retinella* (e.g., Jones 1940a). Pilsbry (1939) arranged Utah records and specimens of both *umbilicata* and *indentata* as the subspecies *Retinella indentata paucilirata*.

As currently recognized, this species is monotypic.

Status in Utah

Specimens have been reported from 3 localities in Utah. Henderson and Daniels (1917) collected this species in Tooele County. Jones (1940a) published 2 localities, 1 in Washington County and 1 in Salt Lake County. Since it is possible that additional records have been reported as the species *indentata* of which *umbilicata* was formerly recognized as a subspecies, the full extent of the range of *Glyphyalinia umbilicata* in Utah remains unclear.

The extent of the populations at the known localities is not known. A total of 53 Utah specimens have been reported in published literature: Henderson and Daniels (1916) collected 16 specimens near Tooele, and Jones (1940a) reported a collection of 35 specimens from Zion National Park and 2 specimens from Salt Lake City.

Threats to this species are unknown. Part of its known range includes Salt Lake County and eastern Tooele County, an area experiencing rapid development. Habitat loss is a threat requiring further examination. Population trend of this species in Utah is unknown.

Inventory for this species is necessary throughout the state but particularly within its reported Utah range. The last published report of *G. umbilicata* is from 1940; updated information is required to evaluate its current status and trends.

Habitats Utilized in Utah

Henderson and Daniels (1916) first collected this species in Utah in a "cottonwood grove at picnic grounds just within [the] mouth of [a] gulch"

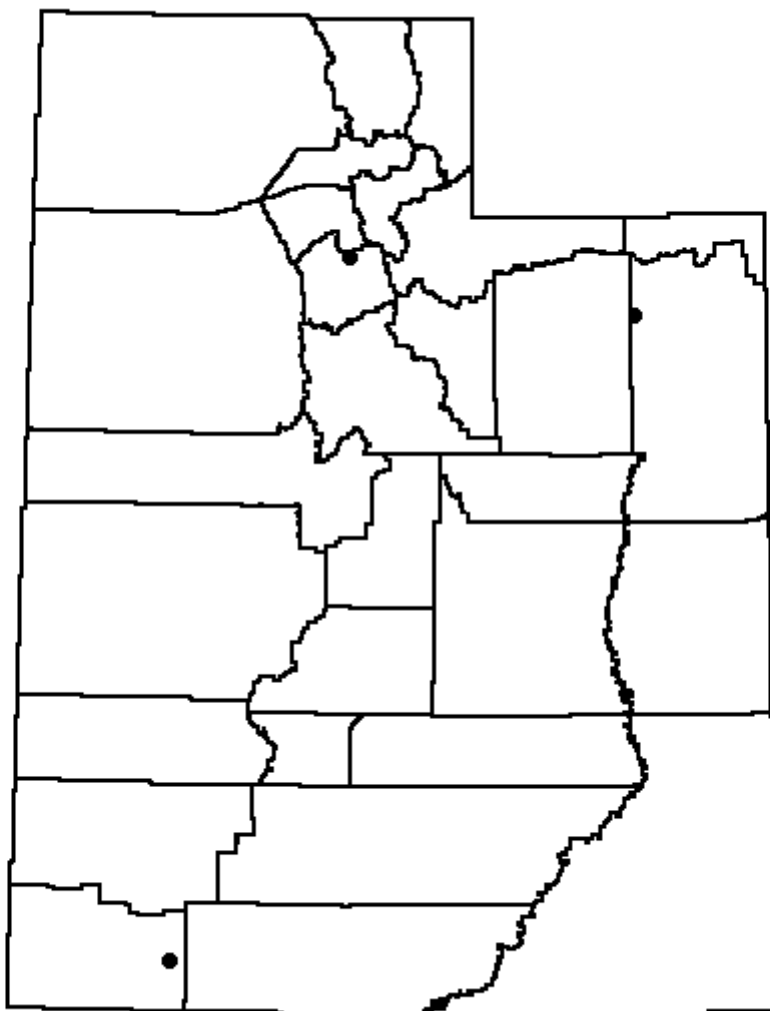


Figure 75. Utah localities for the Texas glyph (*Glyphyalinia umbilicata*) obtained from literature.

***Ogaridiscus subrupicola* (Dall, 1877)**

southern tightcoil

Utah Taxonomy

The species was initially described as *Hyalina subrupicola* by Dall (1877). Subsequently, Dall (1895) assigned the species to the genus *Vitrea*. Chamberlin and Jones (1929) placed the species in the monotypic genus *Ogaridiscus* but this taxon was later submerged as a subgenus of *Pristiloma*. *Ogaridiscus* was returned to generic status by Riedel (1980) based on examination of soft anatomy.

The type race, *Ogaridiscus subrupicola subrupicola*, occurs in Utah.

Status in Utah

This species is known in Utah from a single locality, Clinton's Cave in Tooele County (Chamberlin and Jones 1929).

This species is apparently rare at its only Utah locality. Chamberlin and Jones (1929) commented that Berry and Miner "secured a few living specimens", and they added: "We secured other specimens later, but they are scarce."

The cave that harbors the only known population of this species in Utah is located on property owned by Kennecott Utah Copper. If the population is still extant, its continued existence would be jeopardized by any activities affecting the cave environment.

No attempt to relocate this species in Utah has been reported since 1929; data are not sufficient to evaluate population trends.

Verification of the continued existence of this population is necessary. Clinton's Cave does not appear on topographic maps and is currently considered a "lost" locality.

Habitats Utilized in Utah

This species is found in a cave near the Great Salt Lake. A description of the conditions within the cave where the colony is found is not available.

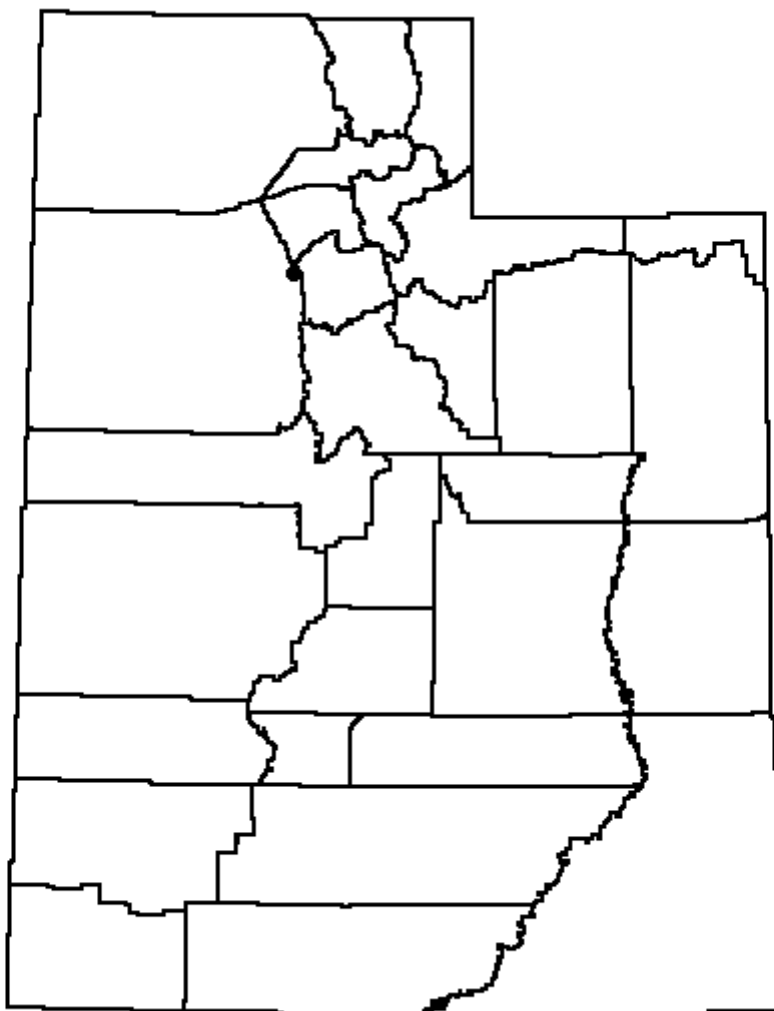


Figure 76. The Utah locality for the southern tightcoil (*Ogaridiscus subrupicola*) obtained from literature.

***Hawaiiia minuscula* (A. Binney, 1841)**
minute gem

Utah Taxonomy

Early works that dealt with all mollusks in Utah (Chamberlin and Jones 1929, Jones 1940a) did not list this species for the state. Gregg (1940, 1942) reported *Hawaiiia minuscula neomexicana* from southwestern Utah, but this taxon is now considered to be distinct from *Hawaiiia minuscula* and a full species itself: *Hawaiiia neomexicana*. Roscoe (1954) reported *Hawaiiia minuscula* from extreme west-central Utah but made no assignment to race. That what Roscoe (1954) reported in Utah as *Hawaiiia minuscula* almost certainly was this species in the strict sense and not *Hawaiiia neomexicana* is strongly suggested by his publication with Chamberlin (Chamberlin and Roscoe 1948), which lists both *Hawaiiia minuscula minuscula* and *Hawaiiia minuscula neomexicana* in Utah and reveals that Roscoe was distinguishing the two taxa.

The subspecies that occurs in Utah is the type race, *Hawaiiia minuscula minuscula*.

Status in Utah

One occurrence of this species has been reported historically in Utah: in the Deep Creek Mountains of extreme west-central Utah near the Nevada border (Juab County) (Roscoe 1954). However, at least one other, earlier, occurrence of the species in this state evidently was known by Chamberlin and Roscoe (1948) and Roscoe (1954). The specimens from the Deep Creek Mountains were collected in 1953 (Roscoe 1954). However, Chamberlin and Roscoe (1948) listed "*Hawaiiia minuscula minuscula*" (= *Hawaiiia minuscula*) as occurring in Utah and clearly were distinguishing it from "*Hawaiiia minuscula neomexicana*" (= *Hawaiiia neomexicana*), which they also listed as occurring in the state. Since this listing of "*Hawaiiia minuscula minuscula*" in Utah (Chamberlin and Roscoe 1948) was published several years before the specimens reported by Roscoe (1954) were collected (i.e., 1953), *Hawaiiia minuscula* (s.s.) must have been collected elsewhere in the state before Roscoe's (1954) record, which Roscoe stated was the first from the county (Juab) but did not claim as the first from the state. Thus it is apparent that *Hawaiiia minuscula* was first discovered in Utah sometime between Chamberlin and Jones' (1929) work, which made no mention of this genus in Utah, and Chamberlin and Roscoe's (1948) list, but no published report of the species in Utah prior to that of Roscoe (1954) has been found.

The only report of this species in Utah (Roscoe 1954) did not provide any information regarding its abundance.

Threats to this species in Utah are not known; similarly, population trend of this species in Utah is unknown.

Inventory is needed in the Deep Creek Mountains, from which this species has been reported, and elsewhere to determine the extent of its distribution and abundance in this state.

Habitats Utilized in Utah

The only information that has been reported regarding the habitat of this species in Utah is that of Roscoe (1954), who wrote that it was collected "[i]n Aspen, Douglas Fir forest, el. ca. 7500 feet", and this was "at base of cliff, south side of canyon bottom".

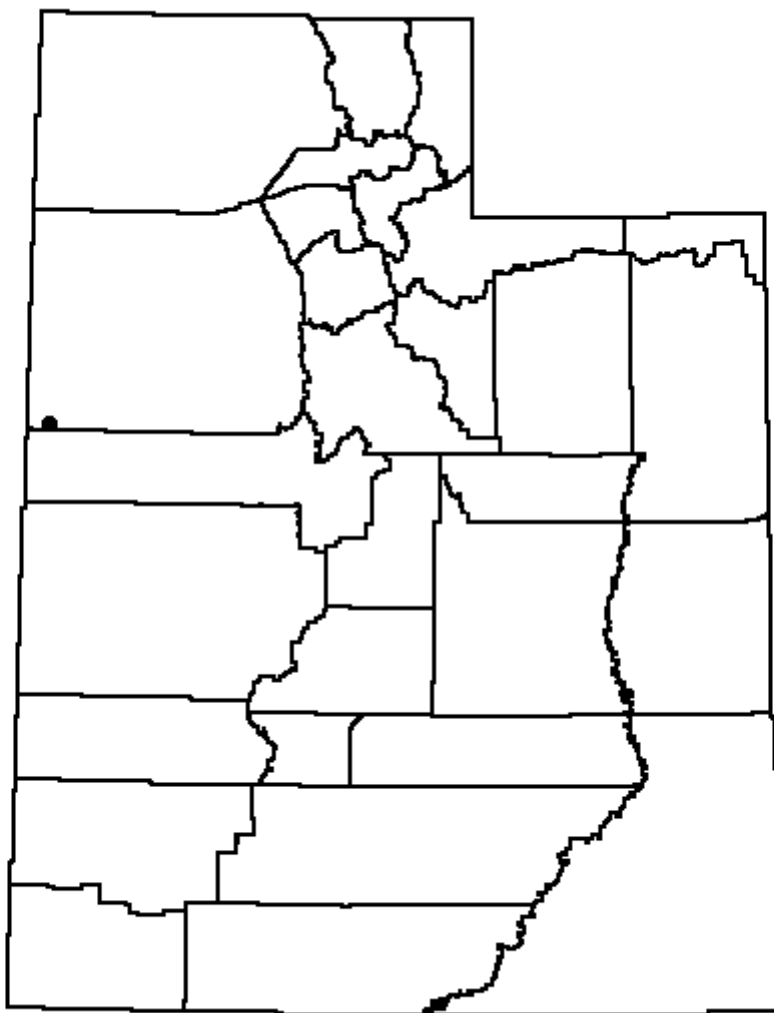


Figure 77. The Utah locality for the minute gem (*Hawaiiia minuscula*) obtained from literature.

***Hawaiiia neomexicana* (Cockerell and Pilsbry, 1900)**
striate gem

Utah Taxonomy

Both the original (Gregg 1940) and a subsequent (Gregg 1942) report of this species in Utah arranged it as a race of *Hawaiiia minuscula*, and a later list of the mollusks of Utah (Chamberlin and Roscoe 1948) followed the same taxonomic arrangement.

No subspecies have been proposed in this species (i.e., the species is monotypic).

Status in Utah

This species has been reported from 3 localities in southwestern Utah: 2 in eastern Washington County (Gregg 1940) and 1 in extreme southwestern Garfield County (Gregg 1942).

The only information regarding abundance of this species in Utah comes from Gregg (1940), who reported 3 specimens from 2 localities; however, he did not state whether any of the 3 specimens were alive when found.

Threats to this species in Utah are not known. Population trend of this species in Utah also is not known, but it may be stable.

Inventory is needed at the 3 sites of reported occurrence of this species in Utah to ascertain whether it still exists at these localities. It should also be sought elsewhere in at least southern Utah, particularly in Kane and San Juan counties.

Habitats Utilized in Utah

The only habitat information that has been reported for this species in Utah is that of Gregg (1940), who mentioned finding it "near a spring near the entrance to [a canyon]".

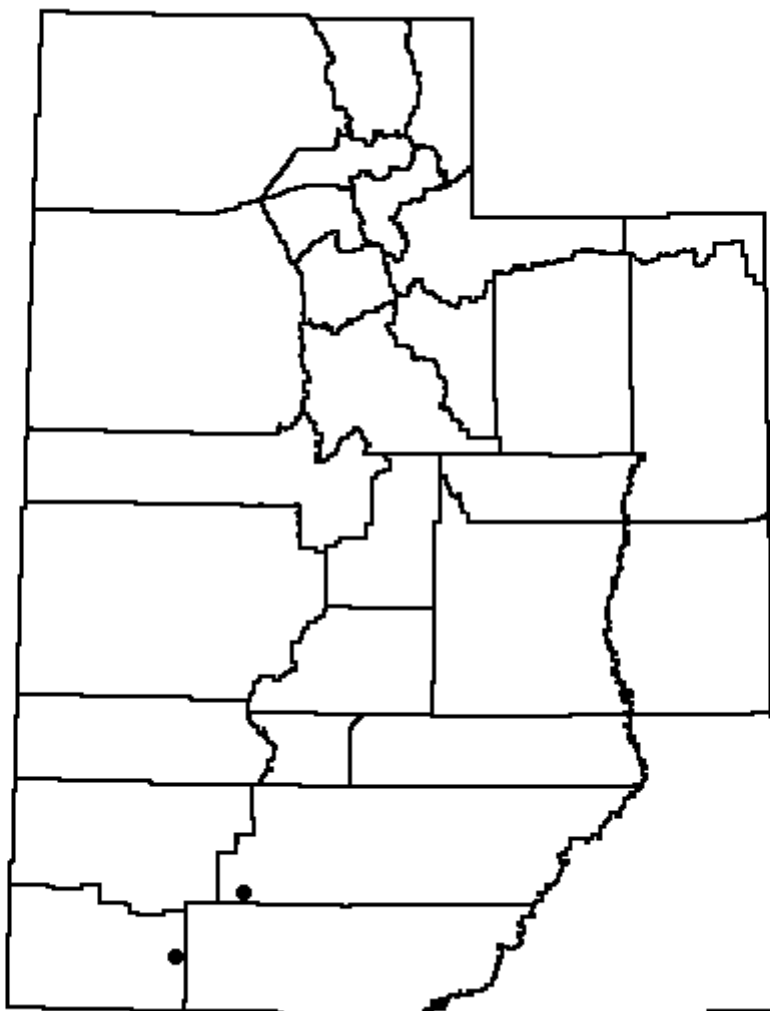


Figure 78. Utah localities for the striate gem (*Hawaiiia neomexicana*) obtained from literature.

***Zonitoides nitidus* (Müller, 1774)**
black gloss

Utah Taxonomy

Chamberlin and Jones (1929) called this species *Zonitoides nitida*, the black-bodied leaf snail.

The species is monotypic.

Status in Utah

This species has been reported from 6 localities in the Wasatch Mountains in 4 counties in the north-central part of the state: Cache, Weber, Summit, Salt Lake, and Utah counties (Chamberlin and Jones 1929, Jones 1940a, Woolstenhulme 1942a, 1942b).

All Utah collections of this species have been from localized areas where relatively low numbers of specimens were taken. Jones (1940a) reported individual collections, in Utah, of 10, 4, "several", and 1; Woolstenhulme (1942a) reported 1 specimen; and Woolstenhulme (1942b) listed 2 collections of 4 each.

Because populations are apparently small and localized, they could potentially be affected by random catastrophic events. Since this species is characteristically found at or near water's edge, it is not surprising that flooding has been known to affect its local distribution. Jones (1940a) described this for the population at the mouth of Ogden Canyon: "... [I]n 1927, the first records of *Zontioides* [sic] *nitidus* for the state had been taken along the water's edge in Ogden River. This colony had been swept away by floods before 1936. However, a small colony was found during the high water of that year in an overflow of a spring at the mouth of the canyon above the high water mark. Mr. Brizzee found other survivors near the mouth of the canyon in 1939." Population trend in this species is unknown in Utah.

Inventory is needed in the Wasatch and Uinta Mountains. Populations in the Wasatch Mountains have not been documented in the published literature since 1942.

Habitats Utilized in Utah

Chamberlin and Jones (1929) found this snail "on the moist banks of streams at the water's edge."

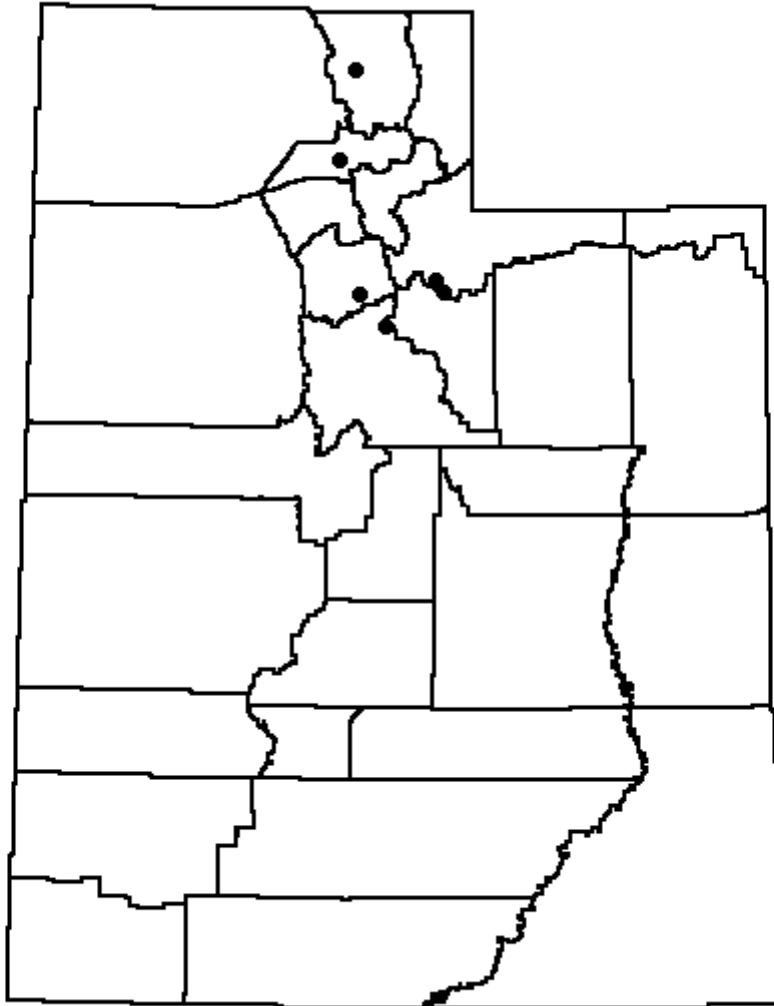


Figure 79. Utah localities for the black gloss (*Zonitoides nitidus*) obtained from literature.

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Appendix

MOLLUSK TAXA INCLUDED ON THE 1998 UTAH SENSITIVE SPECIES LIST

STATE ENDANGERED SPECIES

Kanab ambersnail (*Oxyloma haydeni kanabensis*) [*Oxyloma kanabense*]¹
Fish Springs pond snail [Fish Springs marshsnail] (*Stagnicola pilsbryi*)
Utah valvatasnail [desert valvata] (*Valvata utahensis*)¹

STATE THREATENED SPECIES

California floater (*Anodonta* [sic] *californiensis*)
thickshell pondsnail (*Stagnicola utahensis*)

SPECIES OF SPECIAL CONCERN

(SP: Due to declining population)

round mouth valvata [glossy valvata] (*Valvata humeralis*)

(SD: Due to limited distribution)

Clinton Cave snail [southern tightcoil] (*Pristiloma subrupicola*) [*Ogaridiscus subrupicola*]
Eureka mountainsnail (*Oreohelix eurekaensis eurekaensis*) [*Oreohelix eurekaensis*]
lyrate mountainsnail (*Oreohelix haydeni haydeni*) [*Oreohelix haydeni*]
Ogden rocky mountainsnail [Deseret mountainsnail] (*Oreohelix peripherica wasatchensis*)
[*Oreohelix peripherica*]²
wet-rock physa (*Physella zionis*)
Yavapai mountainsnail (*Oreohelix yavapai*)

(SP/SD: Due to declining populations and limited distribution)

Brian Head mountainsnail (*Oreohelix parowanensis* [sic])
fat-whorled pondsnail (*Stagnicola bonnevillensis*)²
Utah physa (*Physella utahensis*)
Uinta mountainsnail [Eureka mountainsnail] (*Oreohelix eurekaensis uinta*) [*Oreohelix eurekaensis*]
desert spring snail (*Pyrgulopsis deserta*)
Fish Lake physa snail (*Physella microstriata*)

¹ Species is Federally listed as Endangered

² Species is a candidate for Federal listing as Threatened or Endangered

[] Indicates species names as they are designated in this report.